Chapter 1 Proposed Project

1.1 Introduction

California participated in the "Surface Transportation Project Delivery Pilot Program" (Pilot Program) pursuant to 23 United States Code (U.S.C.) 327, for more than 5 years, beginning July 1, 2007, and ending September 30, 2012. MAP-21 (Moving Ahead for Progress in the 21st Century) (Public Law [P.L.] 112-141), signed by President Obama on July 6, 2012, amended 23 U.S.C. 327 to establish a permanent Surface Transportation Project Delivery Program. As a result, the California Department of Transportation (Caltrans) entered into a Memorandum of Understanding (MOU) pursuant to 23 U.S.C. 327 (National Environmental Policy Act [NEPA] Assignment MOU) with the Federal Highway Administration (FHWA). The NEPA Assignment MOU became effective October 1, 2012, and was renewed on December 23, 2016, for a term of 5 years. In summary, Caltrans continues to assume FHWA responsibilities under NEPA and other federal environmental laws in the same manner as was assigned under the Pilot Program, with minor changes. With NEPA Assignment, FHWA assigned and Caltrans assumed all of the United States Department of Transportation (USDOT) Secretary's responsibilities under NEPA. This assignment includes projects on the State Highway System and Local Assistance Projects off of the State Highway System within the State of California, except for certain categorical exclusions (CEs) that FHWA assigned to Caltrans under the 23 U.S.C. 326 CE Assignment MOU, projects excluded by definition, and specific project exclusions.

Caltrans District 12, in cooperation with the Orange County Transportation Authority (OCTA) as the funding agency, proposes the Interstate 405 (I-405) Improvement Project from postmile (PM) 0.2 at Interstate 5 (I-5) to PM 8.7 at State Route 55 (SR-55). The approximately 8.5-mile-long project is located primarily in the city of Irvine and portions of both the city of Costa Mesa and unincorporated Orange County. Figures 1-1 and 1-2 show the Project Vicinity and Project Location, respectively. Caltrans is the lead agency for both the California Environmental Quality Act (CEQA) and NEPA, as assigned by FHWA. OCTA is the project sponsor.

Figure 1-1. Proposed Project Vicinity

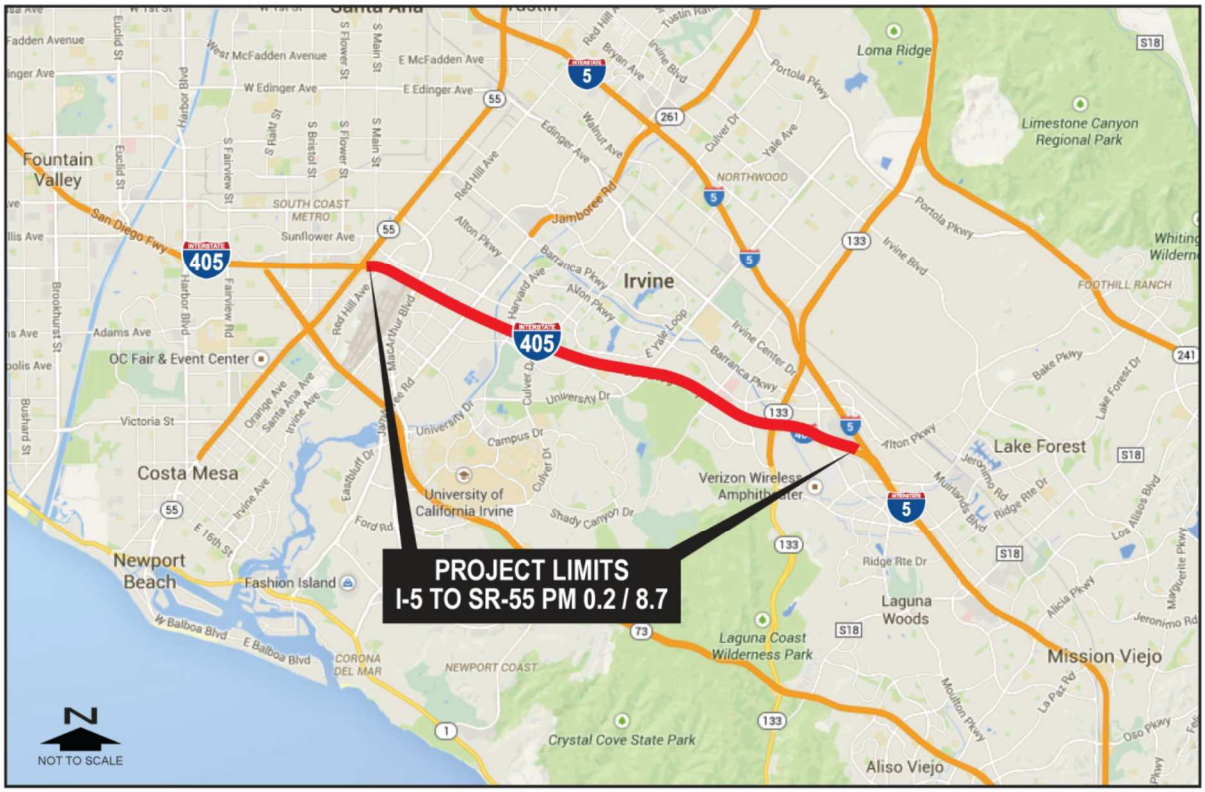


Figure 1-2. Proposed Project Location

Alternative 1 represents the No Build Alternative, under which no modifications to existing roadways would be undertaken. Existing freeway, ramp, and arterial roadway configurations would remain unchanged and no construction would occur. Alternative 2 (Preferred Alternative) would add a single general purpose (GP) lane in the northbound (NB) direction of I-405 between State Route 133 (SR-133) and Culver Drive and a single GP lane in the southbound (SB) direction between University Drive/Jeffrey Road and Irvine Center Drive. Adding GP lanes to these segments would provide a fifth continuous GP lane from SR-133 to SR-55 in the NB direction and from SR-55 to Bake Parkway in the SB direction. Alternative 3 would include the GP lanes described in Alternative 2 and an additional GP lane in the NB direction of I-405 between SR-133 and Jamboree Road and in the SB direction between Culver Drive and SR-133. Alternative 3 would provide a sixth continuous GP lane from SR-133 to Jamboree Road in the NB direction and from MacArthur Boulevard to SR-133 in the SB direction. This project is proposed as a means of adding mainline capacity to reduce corridor congestion and improve mobility, improving capacity of the ramps within the project limits along the I-405 corridor, and improving freeway operations, including weaving, merging and

diverging, and Intelligent Transportation System (ITS) elements within the project limits along the I-405 corridor.

The project is identified in the approved Federal Transportation Improvement Program (FTIP) (2017) as project ORA131304. The 2017 FTIP was adopted by the Southern California Association of Governments (SCAG) on September 1, 2016 and approved for air quality conformity by FHWA on December 16, 2016. The project description in the FTIP is:

> I-405(I-5 TO SR-55)-Add 1 MF Lane Each Direction From I-5 TO SR-55 And Improve Merging. (Utilize toll credit match for RSTP.) Eng. Only

SCAG is the Metropolitan Planning Organization (MPO) that represents 6 counties (Orange, Imperial, Riverside, San Bernardino, Los Angeles, and Ventura) and 191 cities in southern California. The project is identified in the financially constrained project list of the approved SCAG 2016-2040 Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS) as Project 2M0728.

In addition, the project is included in the Measure M2 Freeway Program and *Next 10 Delivery Plan (2017-2026)* adopted by OCTA in November 2016.

The project is anticipated to be constructed between 2026 and 2030 with an opening year of 2030 and a design year of 2050. The milestones for the project schedule are as follows.

Project Milestone	Tentative Milestone Date
Begin Environmental	December 2014 (actual)
PA/ED Approval	August 2018
Begin PS&E	June 2022
PS&E Completion	August 2025
Right of Way Certification	December 2025
Ready to List (RTL)	January 2026
Award Contract	July 2026
Approve Contract/Notice to Proceed	August 2026
Contract Acceptance/Construction Completion	February 2030
End Project/Closeout	February 2032

1.1.1 Existing Facility

I-405 is a major north-south interstate highway running along the western portion of the greater Los Angeles area from San Fernando in the north to Irvine in the south. It traverses 48 miles of Los Angeles County and 24 miles of Orange County. Within the project corridor, I-405 is a controlled-access freeway with 8 to 10 mixed-flow GP lanes, 2 high-occupancy vehicle (HOV) lanes, 6 local interchanges, and 3 freeway-to-freeway interchanges at I-5, SR-133, and SR-55.

I-405 is part of the National Highway System (NHS) that provides access between cities in Orange and Los Angeles counties. The freeway is used for commuting and intraregional travel, along with direct and indirect access to employment centers, recreational attractions, shopping malls, medical centers, universities, airports, and other land uses. I-405 was added to the State Highway System in 1933 and to the California Freeway and Expressway System in 1959. Construction of the freeway within the proposed project limits was completed in 1969. The original construction provided four GP lanes in each direction. HOV lanes were added in 1991.

In the NB direction, there are three distinct mainline segments. Proceeding in the direction of travel:

- The first segment is from I-5 to SR-133 (PM 0.2 to 1.8). It consists of five GP lanes, one HOV lane, and an auxiliary lane between the Irvine Center Drive and SR-133 interchanges.
- The second segment is from SR-133 to Culver Drive (PM 1.8 to 5.6). It consists of four GP lanes, one HOV lane, and auxiliary lanes between the SR-133, Sand Canyon Avenue, and Jeffrey Road/University Drive interchanges, and preceding the Culver Drive NB off-ramp.
- The third segment is from Culver Drive to SR-55 (PM 5.6 to 8.7). It consists of five GP lanes, one HOV lane, and auxiliary lanes ahead of the Jamboree Road exit ramp and between the Jamboree Road, MacArthur Boulevard, and SR-55 interchanges.

In the SB direction, there are two distinct mainline segments:

- The first segment is from SR-55 to Culver Drive (PM 8.7 to 5.6). It consists of five GP lanes, one HOV lane, one long auxiliary lane between the MacArthur Boulevard and Culver Drive interchanges, and auxiliary lanes between the SR-55, MacArthur Boulevard, and Jamboree Road interchanges.
- The second segment is from Culver Drive to I-5 (PM 5.6 to 0.2). It consists of four GP lanes, one HOV lane, and auxiliary lanes ahead of the SR-133 diverging branch connector and between the SR-133, Irvine Center Drive, and I-5 interchanges.

Existing (2015) condition average daily traffic (ADT) volume along I-405 between I-5 and SR-55 is approximately 250,000, while the weekday daily vehicle miles traveled (VMT) within the project corridor is 2.0 million.

1.1.2 Project Background

In November 2006, Orange County voters approved renewal of the Measure M one-half cent sales tax for transportation improvements. The original Measure M (M1) was approved in 1990 with a sunset in 2011. With approval of Renewed Measure M (M2), the voters agreed to a continued investment of local tax dollars in Orange County's transportation infrastructure for another 30 years to 2041.

In 2012, the M2020 Plan was approved by the OCTA Board to provide guidance on program delivery priorities between 2013 and 2020. This plan was developed as a self-sustaining sales tax measure; however, due to slower than anticipated growth in the M2 sales tax revenue proceeds, the M2020 Plan objectives were revisited in 2016 to assess implications of the revised long-term revenue forecast, to determine what had been accomplished to date, and assess what can be assumed to move forward. A new plan was created to replace the M2020 Plan called the *Next 10 Delivery Plan*. The *Next 10 Delivery Plan* provides guidance for what can be accomplished over the 10 years between 2017 and 2026. The proposed project is included in the *Next 10 Delivery Plan* as Project L.

OCTA completed a Major Investment Study (MIS) for south Orange County in 2008. The MIS developed an integrated, multimodal transportation plan that addresses the mobility needs of motorists, pedestrians, and transit users. The OCTA Board adopted a resolution supporting the Locally Preferred Strategy (LPS) identified in the MIS, which included the addition of GP lanes and interchange improvements on I-405.

1.2 Purpose and Need

1.2.1 Purpose of the Project

The purpose of the proposed project is to address existing and future traffic demand and provide future mobility while minimizing environmental and economic impacts. The project would address congestion and enhance freeway operations within the project limits along I-405 as follows:

- Add mainline capacity to reduce corridor congestion and improve mobility

- Improve capacity of the ramps and operational and geometric deficiencies within the project limits along the I-405 corridor
- Improve freeway operations, including weaving, merging and diverging, and ITS elements within the project limits along the I-405 corridor

The goal of the proposed project is to also minimize environmental impacts, as well as right-of-way (ROW) acquisitions, within the project limits.

1.2.2 Need for the Project

The portion of the I-405 corridor between I-5 and SR-55 is experiencing congestion and long traffic delays during morning and evening peak periods due to local, regional, and interregional traffic demand exceeding capacity. In addition, forecasted local and regional traffic demand is expected to increase. The resulting traffic volumes along the corridor range between 250,000 in 2015 and a maximum of 291,000 vehicles per day by the year 2050. Improvements are needed within the project limits due to the following conditions:

- High level of congestion during weekdays, especially during peak periods due to insufficient existing mainline capacity
- Congestion at interchange on- and off-ramps due to high demand, limited storage capacity, and operational and geometric deficiencies
- Inadequate ITS infrastructure along I-405 and at interchanges

1.2.3 Capacity, Transportation Demand, and Safety

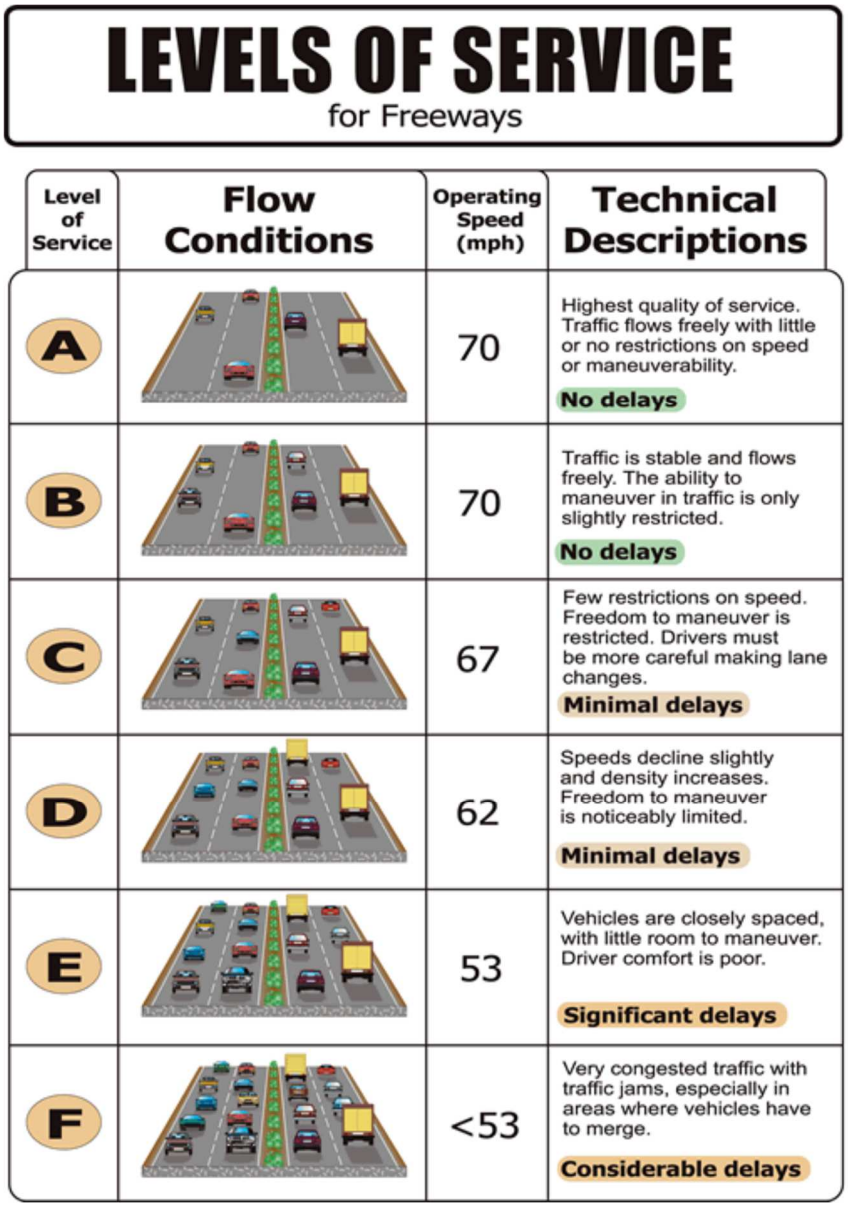
1.2.3.1 Capacity and Transportation Demand

The capacity of a roadway is determined by the number of vehicles that can reasonably pass over a given section in a given period of time. The ability of a roadway to accommodate traffic is typically measured in terms of level of service (LOS). The LOS is a qualitative measure that describes the operating conditions of a roadway. It is largely based on vehicle speed, density, travel time, delay, and maneuverability. The LOS traffic flow is classified in a range from LOS A (free-flowing traffic with low volumes and high speeds) to LOS F (traffic volume exceeding design capacity with substantial delay). The LOS for freeways is shown in Figure 1-3. Daily traffic volumes are used to estimate the extent to which peak-hour traffic volumes equal or exceed the maximum desirable capacity of a roadway.

The following sections summarize the existing (2015) conditions and future traffic congestion on I-405, including all mainline segments and ramp junctions along the project corridor from

I-5 to SR-55. The horizon year (2050) data are shown for future traffic conditions anticipated along the project corridor. Traffic forecasts were developed using the most current version of the Orange County Transportation Analysis Model (OCTAM 3.4.1).

The analysis looks at the morning (6:00 to 9:00 a.m.) and afternoon peak periods (4:00 to 7:00 p.m.). The peak period is the period of the day during which the maximum amount of travel occurs.



Source: Caltrans Standard Environmental Reference.

Figure 1-3. Levels of Service for Freeways

Existing (Year 2015) Level of Service

Mainline

Under existing (2015) conditions, most of the GP lane segments operate at LOS F during the AM and PM peak hours in both directions, as shown in Table 1-1. The following NB and SB segments operate at LOS F in the GP lanes during the AM or PM peak hours:

I-405 NB Segments

- Between Enterprise Drive on-ramp and Irvine Center Drive on-ramp (AM)
- Between Irvine Center Drive on-ramp and SR-133 SB off-ramp (AM)
- Between SR-133 SB off-ramp and SR-133 NB/SB on-ramps (AM)
- Between SR-133 NB/SB on-ramps and Sand Canyon Avenue off-ramp (AM and PM)
- Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue loop on-ramp (AM and PM)
- Between Sand Canyon Avenue loop on-ramp and Sand Canyon Avenue direct on-ramp (AM)
- Between Sand Canyon Avenue direct on-ramp and Jeffrey Road off-ramp (AM)
- Between Jeffrey Road off-ramp and Jeffrey Road loop on-ramp (AM)
- Between Jeffrey Road loop on-ramp and Jeffrey Road direct on-ramp (AM)
- Between Culver Drive off-ramp and Culver Drive loop on-ramp (PM)
- Between Jamboree Road off-ramp and Jamboree Road loop on-ramp (PM)
- Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp (PM)
- Between Jamboree Road direct on-ramp and MacArthur Boulevard off-ramp (PM)
- Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp (PM)
- Between MacArthur Boulevard on-ramp and SR-55 NB/SB off-ramps (PM)

Table 1-1. Existing (Year 2015) Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	Number of Lanes			AM Peak Hour							PM Peak Hour						
				HOV[3]			GP & AUX[4]				HOV[3]			GP & AUX[4]			
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS
NORTHBOUND																	
Between Enterprise Drive off-ramp and truck bypass lane on-ramp	1	3	0	1,184	0.54	C	4,146	*56*	26.3	D	748	0.34	B	3,491	*71*	17.3	B
Between truck bypass on-ramp and Enterprise Drive on-ramp	1	5	0	1,405	0.64	C	6,551	56	24.9	C	899	0.41	B	5,487	71	16.4	B
Between Enterprise Drive on-ramp and Irvine Center Drive on-ramp	1	5	1	1,405	0.64	C	6,770	26	52.0	F	899	0.41	B	6,172	65	20.2	C
Between Irvine Center Drive on-ramp and SR-133 SB off-ramp	1	5	1	1,405	0.64	C	6,990	23	59.4	F	899	0.41	B	6,763	50	27.9	C
Between SR-133 SB off-ramp and SR-133 NB/SB on-ramps	1	5	0	1,467	0.67	C	6,403	*19*	72.1	F	1,045	0.48	B	5,989	*47*	27.3	D
Between SR-133 NB/SB on-ramps and Sand Canyon Avenue off-ramp	1	4	1	1,467	0.67	C	8,637	15	150.0	F	1,045	0.48	B	7,775	43	52.0	F
Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue loop on-ramp	1	4	0	1,317	0.60	C	8,474	25	90.6	F	984	0.45	B	7,337	43	45.1	F
Between Sand Canyon Avenue loop on-ramp and Sand Canyon Avenue direct on-ramp	1	4	1	1,566	0.71	C	8,751	*26*	84.4	F	1,377	0.63	C	7,201	*44*	39.7	E
Between Sand Canyon Avenue direct on-ramp and Jeffrey Road off-ramp	1	4	1	1,566	0.71	C	9,226	27	82.4	F	1,377	0.63	C	8,058	45	42.0	E
Between Jeffrey Road off-ramp and Jeffrey Road loop on-ramp	1	4	0	1,566	0.71	C	7,809	30	69.6	F	1,377	0.63	C	7,070	43	43.5	E
Between Jeffrey Road loop on-ramp and Jeffrey Road direct on-ramp	1	4	0	1,566	0.71	C	8,046	35	61.4	F	1,377	0.63	C	7,244	46	41.6	E

Table 1-1. Existing (Year 2015) Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	Number of Lanes			AM Peak Hour							PM Peak Hour						
				HOV[3]			GP & AUX[4]				HOV[3]			GP & AUX[4]			
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS
Between Jeffrey Road direct on-ramp and Culver Drive off-ramp	1	4	1	1,555	0.71	C	8,967	61	34.9	D	1,408	0.64	C	7,749	54	33.7	D
Between Culver Drive off-ramp and Culver Drive loop on-ramp	1	4	0	1,555	0.71	C	8,282	56	39.5	E	1,401	0.64	C	7,203	41	46.5	F
Between Culver Drive loop on-ramp and Culver Drive direct on-ramp	1	5	0	1,555	0.71	C	8,821	59	32.0	D	1,401	0.64	C	7,641	48	33.7	D
Between Culver Drive direct on-ramp and Jamboree Road off-ramp	1	5	1	963	0.44	B	10,319	57	35.2	E	1,209	0.55	C	8,387	38	42.5	E
Between Jamboree Road off-ramp and Jamboree Road loop on-ramp	1	5	0	984	0.45	B	8,262	58	30.5	D	1,219	0.55	C	7,650	27	59.9	F
Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp	1	5	0	984	0.45	B	8,669	60	31.0	D	1,219	0.55	C	8,532	24	75.2	F
Between Jamboree Road direct on-ramp and MacArthur Boulevard off-ramp	1	5	1	984	0.45	B	9,714	*63*	33.0	D	1,219	0.55	C	9,477	*25*	79.8	F
Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp	1	5	0	781	0.36	B	8,039	66	26.2	D	1,148	0.52	B	8,734	26	71.1	F
Between MacArthur Boulevard on-ramp and SR-55 NB/SB off-ramps	1	5	1	781	0.36	B	8,392	65	26.0	C	1,148	0.52	B	9,852	34	61.8	F
SOUTHBOUND																	
Between SR-55 SB on-ramp and MacArthur Boulevard off-ramp	1	5	1	1,258	0.57	C	10,887	48	57.2	F	1,116	0.51	B	8,414	34	63.1	F

Table 1-1. Existing (Year 2015) Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	Number of Lanes			AM Peak Hour							PM Peak Hour						
				HOV[3]			GP & AUX[4]				HOV[3]			GP & AUX[4]			
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS
Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp	1	5	0	1,244	0.57	C	9,137	50	38.5	E	1,400	0.64	C	7,329	23	66.7	F
Between MacArthur Boulevard on-ramp and Jamboree Road off-ramp	1	5	2	1,204	0.55	C	9,521	50	27.9	C	1,257	0.57	C	8,112	20	63.0	F
Between Jamboree Road off-ramp and Jamboree Road loop on-ramp	1	5	1	1,204	0.55	C	7,016	50	26.8	D	1,257	0.57	C	6,283	17	70.3	F
Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp	1	5	1	1,204	0.55	C	7,250	46	30.1	D	1,257	0.57	C	6,711	14	91.2	F
Between Jamboree Road direct on-ramp and Culver Drive off-ramp	1	5	1	1,246	0.57	C	7,699	33	44.6	E	1,445	0.66	C	7,469	24	59.2	F
Between Culver Drive off-ramp and Culver Drive loop on-ramp	1	4	0	1,240	0.56	C	6,963	28	65.4	F	1,456	0.66	C	6,246	18	90.8	F
Between Culver Drive loop on-ramp and Culver Drive direct on-ramp	1	4	0	1,240	0.56	C	7,250	30	63.6	F	1,456	0.66	C	6,517	20	85.3	F
Between Culver Drive direct on-ramp and University Drive off-ramp	1	4	0	1,137	0.52	B	7,615	44	45.5	F	1,477	0.67	C	7,045	36	51.2	F
Between University Drive off-ramp and University Drive loop on-ramp	1	4	0	1,137	0.52	B	7,172	36	52.4	F	1,477	0.67	C	6,550	28	61.2	F
Between University Drive loop on-ramp and University Drive direct on-ramp	1	4	0	1,137	0.52	B	7,382	35	55.5	F	1,477	0.67	C	6,800	28	63.6	F
Between University Drive direct on-ramp and Sand Canyon Avenue off-ramp	1	4	0	1,004	0.46	B	8,280	48	45.4	F	1,246	0.57	C	8,046	40	53.3	F

Table 1-1. Existing (Year 2015) Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	Number of Lanes			AM Peak Hour							PM Peak Hour						
				HOV[3]			GP & AUX[4]				HOV[3]			GP & AUX[4]			
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS
Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue on-ramp	1	4	0	1,004	0.46	B	6,996	61	30.2	D	1,246	0.57	C	7,414	51	38.0	E
Between Sand Canyon Avenue on-ramp and SR-133 NB/SB off-ramps	1	4	0	834	0.38	B	7,461	62	31.9	D	1,308	0.59	C	7,811	57	35.9	E
Between SR-133 NB/SB off-ramps and SR-133 NB/SB on-ramps	1	4	0	489	0.22	A	6,241	62	26.5	D	900	0.41	B	6,287	63	26.1	D
Between SR-133 NB/SB on-ramps and Irvine Center Drive off-ramp	1	4	1	818	0.37	B	6,271	64	24.2	C	1,036	0.47	B	6,813	63	27.5	C
Between Irvine Center Drive off-ramp and Irvine Center Drive loop on-ramp	1	4	0	818	0.37	B	4,931	65	20.0	C	1,036	0.47	B	5,806	63	24.0	C
Between Irvine Center Drive loop on-ramp and Irvine Center Drive direct on-ramp	1	4	1	818	0.37	B	4,987	67	17.4	B	1,036	0.47	B	6,202	63	24.2	C
Between Irvine Center Drive direct on-ramp and Bake Parkway off-ramp	1	4	1	818	0.37	B	5,043	67	14.8	B	1,036	0.47	B	6,258	63	22.3	C

Table 1-1. Existing (Year 2015) Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	Number of Lanes			AM Peak Hour							PM Peak Hour						
				HOV[3]			GP & AUX[4]				HOV[3]			GP & AUX[4]			
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Speed[5]	Density	LOS

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2010 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.

   The weaving analysis method was applied to segments highlighted:

   Typical weaving analysis method was applied to the segments highlighted in gray.

   Special weaving analysis method (two consecutive on-ramps) was applied to the segments highlighted in blue.

2. Peak-hour traffic volumes are shown in vehicles per hour (vph).
3. HOV Lane LOS: LOS is based on volume-to-capacity (v/c) ratio using a capacity of 2,200 vph.
4. Observed speeds were extracted from the Caltrans Performance Monitoring System (PeMS).
5. GP and Auxiliary (AUX) Lanes LOS: LOS is based on density (vehicles per mile per lane).

Source: Traffic Study, 2017.

I-405 SB Segments

- Between SR-55 SB on-ramp and MacArthur Boulevard off-ramp (AM and PM)
- Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp (PM)
- Between MacArthur Boulevard on-ramp and Jamboree Road off-ramp (PM)
- Between Jamboree Road off-ramp and Jamboree Road loop on-ramp (PM)
- Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp (PM)
- Between Jamboree Road direct on-ramp and Culver Drive off-ramp (PM)
- Between Culver Drive off-ramp and Culver Drive loop on-ramp (AM and PM)
- Between Culver Drive loop on-ramp and Culver Drive direct on-ramp (AM and PM)
- Between Culver Drive direct on-ramp and University Drive off-ramp (AM and PM)
- Between University Drive off-ramp and University Drive loop on-ramp (AM and PM)
- Between University Drive loop on-ramp and University Drive direct on-ramp (AM and PM)
- Between University Drive direct on-ramp and Sand Canyon Avenue off-ramp (AM and PM)

The HOV lane segments within the project corridor operate at LOS C or better during the AM and PM peak hours in both directions, as shown in Table 1-1.

Ramps

Under existing (2015) conditions, the NB ramp junction peak-hour LOS varies from A to D during the AM and PM peak hours, with the following NB ramp junction locations operating at LOS F during either the AM or PM peak hour:

- Jeffrey Road/University Drive loop on-ramp (AM)
- Jamboree Road loop on-ramp (PM)

For the SB ramp junction locations, the following locations operate at LOS F during the AM or PM peak hours, as indicated in the parentheses:

- Jamboree Road loop on-ramp (PM)
- Jamboree Road direct on-ramp (PM)
- Culver Drive loop on-ramp (AM and PM)
- Culver Drive direct on-ramp (AM and PM)
- Jeffrey Road/University Drive direct off-ramp (AM and PM)

- Jeffrey Road/University Drive loop on-ramp (AM and PM)
- Jeffrey Road/University Drive direct on-ramp (AM and PM)
- Sand Canyon Avenue direct off-ramp (AM and PM)

The freeway ramp junctions identified above operate at LOS F due to freeway congestion either north or south of the ramp.

Average Peak-Hour Speeds

Under the existing (2015) conditions, average speeds in the GP lanes on NB I-405 for a trip within the project limits is 47 and 44 miles per hour (mph) for the AM and PM peak hours, respectively. Average travel speeds in the NB HOV lane during AM and PM peak hours are 50 and 61 mph, respectively. The average speeds in the GP lanes on SB I-405 are 49 and 38 mph for the AM and PM peak hours, respectively. Average travel speeds in the SB HOV lane during AM and PM peak hours are 61 and 56 mph, respectively.

Future (Year 2050) Level of Service – No Build

The future (Year 2050) analysis assumes that the I-405 corridor will not be widened; however, ramp junction and auxiliary lane improvements associated with other improvement projects planned by Caltrans are assumed to be completed. These improvements include construction of an SB auxiliary lane between SR-133 and the Sand Canyon Avenue on-ramp, another between the Sand Canyon Avenue off-ramp and the Jeffrey Road/University Drive on-ramp, and the extension of one SB lane between the University Drive off-ramp and the Culver Drive off-ramp.

In 2050, ADT along the I-405 project corridor is forecast to be approximately 291,184, with weekday daily VMT forecast to be approximately 2.3 million.

Mainline

Under year 2050 conditions, most of the GP lane segments are expected to operate at LOS F during the AM and PM peak hours in both directions, as shown in Table 1-2. The following NB and SB GP lanes segments are expected to operate at LOS F during the AM and/or PM peak hours in 2050:

Table 1-2. Year 2050 No Build Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	# of Lanes			AM Peak Hour[2]						PM Peak Hour[2]					
				HOV[3]			GP & AUX[4]			HOV[3]			GP & AUX[4]		
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS
NORTHBOUND															
Between Enterprise Drive off-ramp and truck bypass lane on-ramp	1	3	0	1,280	0.58	C	4,570	30.7	D	820	0.37	B	3,730	18.9	C
Between truck bypass on-ramp and Enterprise Drive on-ramp	1	5	0	1,530	0.70	C	7,040	27.9	D	970	0.44	B	6,080	18.7	C
Between Enterprise Drive on-ramp and Irvine Center Drive on-ramp	1	5	1	1,530	0.70	C	7,270	67.7	F	970	0.44	B	6,790	22.9	C
Between Irvine Center Drive on-ramp and SR-133 SB off-ramp	1	5	1	1,530	0.70	C	7,630	84.7	F	970	0.44	B	7,430	31.9	D
Between SR-133 SB off-ramp and SR-133 NB/SB on-ramps	1	5	0	1,600	0.73	C	6,680	93.7	F	1,140	0.52	B	6,320	29.9	D
Between SR-133 NB/SB on-ramps and Sand Canyon Avenue off-ramp	1	4	1	1,600	0.73	C	9,360	150.0	F	1,140	0.52	B	8,770	81.7	F
Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue loop on-ramp	1	4	0	1,430	0.65	C	9,190	150.0	F	1,070	0.49	B	8,280	60.8	F
Between Sand Canyon Avenue loop on-ramp and Sand Canyon Avenue direct on-ramp	1	4	1	1,700	0.77	D	9,520	142.7	F	1,500	0.68	C	8,130	51.9	F
Between Sand Canyon Avenue direct on-ramp and Jeffrey Road off-ramp	1	4	1	1,700	0.77	D	10,310	150.0	F	1,500	0.68	C	9,140	55.7	F
Between Jeffrey Road off-ramp and Jeffrey Road loop on-ramp	1	4	0	1,700	0.77	D	8,840	124.8	F	1,500	0.68	C	7,960	57.8	F
Between Jeffrey Road loop on-ramp and Jeffrey Road direct on-ramp	1	4	0	1,700	0.77	D	9,090	95.7	F	1,500	0.68	C	8,150	54.3	F

Table 1-2. Year 2050 No Build Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	# of Lanes			AM Peak Hour[2]						PM Peak Hour[2]					
				HOV[3]			GP & AUX[4]			HOV[3]			GP & AUX[4]		
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS
Between Jeffrey Road direct on-ramp and Culver Drive off-ramp	1	4	1	1,690	0.77	D	10,210	44.0	E	1,530	0.70	C	8,680	41.5	E
Between Culver Drive off-ramp and Culver Drive loop on-ramp	1	4	0	1,690	0.77	D	9,120	47.6	F	1,520	0.69	C	7,980	60.4	F
Between Culver Drive loop on-ramp and Culver Drive direct on-ramp	1	5	0	1,690	0.77	D	9,740	37.9	E	1,520	0.69	C	8,440	40.8	E
Between Culver Drive direct on-ramp and Jamboree Road off-ramp	1	5	1	1,050	0.48	B	11,360	41.9	E	1,320	0.60	C	9,220	53.9	F
Between Jamboree Road off-ramp and Jamboree Road loop on-ramp	1	5	0	1,070	0.49	B	9,230	36.8	E	1,330	0.60	C	8,430	90.9	F
Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp	1	5	0	1,070	0.49	B	9,800	38.2	E	1,330	0.60	C	9,350	129.2	F
Between Jamboree Road direct on-ramp and MacArthur Boulevard off-ramp	1	5	1	1,070	0.49	B	10,890	39.6	E	1,330	0.60	C	10,330	128.8	F
Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp	1	5	0	850	0.39	B	9,150	31.9	D	1,250	0.57	C	9,440	104.7	F
Between MacArthur Boulevard on-ramp and SR-55 NB/SB off-ramps	1	5	1	850	0.39	B	9,540	31.6	D	1,250	0.57	C	10,620	79.6	F
SOUTHBOUND															
Between SR-55 SB on-ramp and MacArthur Boulevard off-ramp	1	5	1	1,370	0.62	C	12,370	82.1	F	1,210	0.55	C	9,170	49.2	F
Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp	1	5	0	1,360	0.62	C	10,550	51.8	F	1,520	0.69	C	8,010	43.0	E

Table 1-2. Year 2050 No Build Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	# of Lanes			AM Peak Hour[2]						PM Peak Hour[2]					
				HOV[3]			GP & AUX[4]			HOV[3]			GP & AUX[4]		
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS
Between MacArthur Boulevard on-ramp and Jamboree Road off-ramp	1	5	2	1,310	0.60	C	11,040	36.6	E	1,370	0.62	C	8,820	38.1	E
Between Jamboree Road off-ramp and Jamboree Road loop on-ramp	1	5	1	1,310	0.60	C	8,440	35.5	E	1,370	0.62	C	6,920	39.5	E
Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp	1	5	1	1,310	0.60	C	8,700	40.5	E	1,370	0.62	C	7,420	40.5	E
Between Jamboree Road direct on-ramp and Culver Drive off-ramp	1	5	1	1,360	0.62	C	9,270	69.6	F	1,570	0.71	C	8,320	42.7	E
Between Culver Drive off-ramp and Culver Drive loop on-ramp	1	5	0	1,350	0.61	C	8,500	59.9	F	1,590	0.72	C	7,040	51.2	F
Between Culver Drive loop on-ramp and Culver Drive direct on-ramp	1	5	0	1,350	0.61	C	8,900	59.7	F	1,590	0.72	C	7,480	55.1	F
Between Culver Drive direct on-ramp and University Drive off-ramp	1	5	0	1,230	0.56	C	9,340	43.6	E	1,610	0.73	C	8,110	41.5	E
Between University Drive off-ramp and University Drive loop on-ramp	1	4	0	1,230	0.56	C	8,830	108.5	F	1,610	0.73	C	7,460	110.0	F
Between University Drive loop on-ramp and University Drive direct on-ramp	1	4	0	1,230	0.56	C	9,080	121.7	F	1,610	0.73	C	7,720	114.6	F
Between University Drive direct on-ramp and Sand Canyon Avenue off-ramp[5]	1	4	1	1,090	0.50	B	10,260	70.7	F	1,360	0.62	C	9,090	53.9	F
Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue on-ramp	1	4	0	1,090	0.50	B	8,690	43.8	E	1,360	0.62	C	8,380	48.7	F
Between Sand Canyon Avenue on-ramp and SR-133 NB/SB off-ramps	1	4	1	910	0.41	B	9,200	38.9	E	1,420	0.65	C	8,870	38.8	E

Table 1-2. Year 2050 No Build Condition I-405 Freeway Mainline Segment Peak-Hour Level of Service[1]

Freeway Segment[1]	# of Lanes			AM Peak Hour[2]						PM Peak Hour[2]					
				HOV[3]			GP & AUX[4]			HOV[3]			GP & AUX[4]		
	HOV	GP	AUX	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS	Traffic Volume[2]	v/c	LOS	Traffic Volume[2]	Density	LOS
Between SR-133 NB/SB off-ramps and SR-133 NB/SB on-ramps	1	4	0	530	0.24	A	7,280	33.8	D	980	0.45	B	6,760	29.2	D
Between SR-133 NB/SB on-ramps and Irvine Center Drive off-ramp	1	4	1	890	0.40	B	7,390	31.3	D	1,130	0.51	B	7,350	31.1	D
Between Irvine Center Drive off-ramp and Irvine Center Drive loop on-ramp	1	4	0	890	0.40	B	5,880	25.6	C	1,130	0.51	B	6,100	25.8	C
Between Irvine Center Drive loop on-ramp and Irvine Center Drive direct on-ramp	1	4	1	890	0.40	B	5,940	22.0	C	1,130	0.51	B	6,510	26.0	C
Between Irvine Center Drive direct on-ramp and Bake Parkway off-ramp	1	4	1	890	0.40	B	6,100	19.6	B	1,130	0.51	B	6,670	24.5	C

Notes:

1. The freeway segments were analyzed based on the Highway Capacity Manual (HCM) 2010 basic freeway segment analysis or weaving analysis method, depending on the lane configuration.

   The weaving analysis method was applied to segments highlighted:

   Typical weaving analysis method was applied to the segments highlighted in gray.

   Special weaving analysis method (two consecutive on-ramps) was applied to the segments highlighted in blue.

2. Peak-hour traffic volumes are shown in vehicles per hour (vph).
3. HOV Lane LOS: LOS is based on volume-to-capacity (v/c) ratio using a capacity of 2,200 vph.
4. GP and Auxiliary (AUX) Lanes LOS: LOS is based on density (vehicles per mile per lane).
5. Observed speeds were extracted from the Caltrans Performance Monitoring System (PeMS).

Source: Traffic Study, 2017.

I-405 NB Segments

- Between Enterprise Drive on-ramp and Irvine Center Drive on-ramp (AM)
- Between Irvine Center Drive on-ramp and SR-133 SB off-ramp (AM)
- Between SR-133 SB off-ramp and SR-133 NB/SB on-ramps (AM)
- Between SR-133 NB/SB on-ramps and Sand Canyon Avenue off-ramp (AM and PM)
- Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue loop on-ramp (AM and PM)
- Between Sand Canyon Avenue loop on-ramp and Sand Canyon Avenue direct on-ramp (AM and PM)
- Between Sand Canyon Avenue direct on-ramp and Jeffrey Road off-ramp (AM and PM)
- Between Jeffrey Road off-ramp and Jeffrey Road loop on-ramp (AM and PM)
- Between Jeffrey Road loop on-ramp and Jeffrey Road direct on-ramp (AM and PM)
- Between Culver Drive off-ramp and Culver Drive loop on-ramp (AM and PM)
- Between Culver Drive direct on-ramp and Jamboree Road off-ramp (PM)
- Between Jamboree Road off-ramp and Jamboree Road loop on-ramp (PM)
- Between Jamboree Road loop on-ramp and Jamboree Road direct on-ramp (PM)
- Between Jamboree Road direct on-ramp and MacArthur Boulevard off-ramp (PM)
- Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp (PM)
- Between MacArthur Boulevard on-ramp and SR-55 NB/SB off-ramps (PM)

I-405 SB Segments

- Between SR-55 SB on-ramp and MacArthur Boulevard off-ramp (AM and PM)
- Between MacArthur Boulevard off-ramp and MacArthur Boulevard on-ramp (AM)
- Between Jamboree Road direct on-ramp and Culver Drive off-ramp (AM)
- Between Culver Drive off-ramp and Culver Drive loop on-ramp (AM and PM)
- Between Culver Drive loop on-ramp and Culver Drive direct on-ramp (AM and PM)
- Between University Drive off-ramp and University Drive loop on-ramp (AM and PM)
- Between University Drive loop on-ramp and University Drive direct on-ramp (AM and PM)
- Between University Drive direct on-ramp and Sand Canyon Avenue off-ramp (AM and PM)
- Between Sand Canyon Avenue off-ramp and Sand Canyon Avenue on-ramp (PM)

Under year 2050 no-build conditions, all HOV lane segments along I-405 within the project corridor are expected to operate at LOS D or better during the AM and PM peak hours in both directions, as shown in Table 1-2.

Ramps

Under year 2050 no-build conditions, the following NB ramp junction locations are expected to operate at LOS F during the AM or PM peak hour, as indicated in the parentheses:

- Jeffrey Road/University Drive loop on-ramp (AM and PM)
- Jeffrey Road/University Drive direct on-ramp (AM)
- Culver Drive direct off-ramp (AM)
- Culver Drive direct on-ramp (PM)
- Jamboree Road direct off-ramp (AM and PM)
- Jamboree Road loop on-ramp (PM)

For the SB ramp junction locations, the following locations are anticipated to operate at LOS F during the AM or PM peak hour, as indicated in the parentheses:

- Jamboree Road direct on-ramp (AM)
- Culver Drive loop on-ramp (AM and PM)
- Jeffrey Road/University Drive loop on-ramp (AM and PM)

The freeway ramp junctions identified above operate at LOS F due to freeway congestion either north or south of the ramp.

Average Peak-Hour Speeds

For year 2050 no-build conditions, average speeds for the AM and PM peak hours on NB I-405 within the project limits are 40 (AM) and 39 mph (PM) for the GP lanes and 55 (AM) and 62 mph (PM) for the HOV lanes. On SB I-405 within the project limits, the average speed in the GP lanes is 43 mph during both the AM and PM peak hours and 63 and 58 mph for the AM and PM peak hours, respectively, in the HOV lanes.

1.2.3.2 Roadway Safety

Traffic accident data for the portion of I-405 and mainline and within the project study limits were obtained from Caltrans Traffic Accident Surveillance and Analysis Systems (TASAS) Table B and TASAS Selective Accident Retrieval (TSAR) for a 3-year period between January 1, 2012, and December 31, 2014.

I-405 Mainline

Table 1-3 presents the latest 3-year accident data between January 1, 2012, and December 31, 2014, for I-405 between I-5 (PM 0.2) and SR-55 (PM 8.7) provided by Caltrans (February 2017). As shown in the table, the accident rates in 16 NB and SB freeway segments comprising the project corridor are lower than the statewide average for similar facilities. In 5 of the 16 segments, fatality rates and/or the combined fatality and injury accident rates are marginally to moderately higher than the statewide average. These locations are shown in boldface in the table.

Table 1-3. I-405 Mainline Accident Data

I-405 Segment	Direction	Accident Rate (a/mvm)					
		Actual Rate			Average Rate		
		F	F+I	TOT	F	F+I	TOT
PM 0.23 – 0.95 I- 405 – Irvine Center Drive	NB	0.000	0.07	0.21	0.003	0.26	0.86
	SB	**0.013**	0.17	0.44	0.003	0.26	0.86
PM 0.95 – 1.80 Irvine Center Drive – SR-133	NB	0.000	0.26	0.75	0.004	0.28	0.92
	SB	**0.010**	0.13	0.33	0.004	0.28	0.92
PM 1.80 – 2.88 SR-133 – Sand Canyon Avenue	NB	**0.014**	0.14	0.93	0.003	0.28	0.94
	SB	**0.007**	0.09	0.48	0.003	0.28	0.94
PM 2.88 – 3.95 Sand Canyon Avenue – University Drive	NB	0.000	0.13	0.53	0.003	0.28	0.95
	SB	0.000	0.09	0.35	0.003	0.28	0.95
PM 3.95 – 5.62 University Drive – Culver Drive	NB	0.000	0.15	0.42	0.004	0.31	1.01
	SB	0.000	0.17	0.51	0.004	0.31	1.01
PM 5.62 – 6.92 Culver Drive – Jamboree Road	NB	0.000	0.12	0.44	0.003	0.28	0.95
	SB	0.000	0.20	0.66	0.003	0.28	0.95
PM 6.92 – 7.80 Jamboree Road – MacArthur Boulevard	NB	0.000	0.20	0.66	0.003	0.28	0.98
	SB	**0.015**	**0.30**	0.96	0.003	0.28	0.98
PM 7.80 – 8.75 MacArthur Boulevard – SR-55	NB	0.000	0.21	0.88	0.005	0.34	1.10
	SB	0.000	0.17	0.62	0.005	0.34	1.10

a/mvm = accidents per million vehicle miles
F = Fatality, I = Injury, TOT = Total
Boldface indicates that the actual accident rate is higher than the statewide average.

Source: TASAS, 2015.

The breakdown of accidents by type that occurred on NB and SB I-405 during the 3-year review period is summarized in Table 1-4. The table indicates that the predominant types of accidents on the I-405 mainline are rear-end collisions, followed by sideswipe and hit object-type collisions.

Table 1-4. I-405 Mainline Accident Type

Location	Direction	Percent of Accidents by Type									
		Head-On	Side-swipe	Rear End	Broad-side	Hit Object	Over-turn	Auto-Ped	Other	Not Stated	Total
PM 0.23 – 0.95 Lake Forest Drive – Irvine Center Drive	NB	0	6	69	0	25	0	0	0	0	100
	SB	0	21	40	3	27	3	3	3	0	100
PM 0.95 – 1.80 Irvine Center Drive – SR-133	NB	0	18	63	3	13	3	0	0	0	100
	SB	0	33	40	6	18	3	0	0	0	100
PM 1.80 – 2.88 SR-133 – Sand Canyon Avenue	NB	0	15	77	1	5	2	0	0	0	100
	SB	1	30	49	0	20	0	0	0	0	100
PM 2.88 – 3.95 Sand Canyon Avenue – University Drive	NB	0	17	76	1	4	1	0	0	0	100
	SB	0	15	69	2	8	4	0	2	0	100
PM 3.95 – 5.62 University Drive– Culver Drive	NB	0	18	74	0	5	2	0	1	0	100
	SB	0	10	80	1	4	2	0	1	2	100
PM 5.62 – 6.92 Culver Drive – Jamboree Road	NB	0	17	68	2	7	5	0	1	0	100
	SB	0	21	71	1	5	1	0	1	0	100
PM 6.92 – 7.80 Jamboree Road – MacArthur Boulevard	NB	1	14	78	2	2	2	0	1	0	100
	SB	0	13	79	1	5	1	0	1	0	100
PM 7.80 – 8.75 MacArthur Boulevard – SR-55	NB	0	16	75	2	5	1	0	1	0	100
	SB	0	20	70	2	8	0	0	0	0	100

Source: TASAS, 2015.

The accident data suggest that the primary cause of accidents along the I-405 mainline is traffic congestion, resulting in rear-end, sideswipe, and hit object collisions.

I-405 Ramps

The accident history reveals that 8 out of 25 ramps along NB I-405 have actual total accident rates that are higher than the statewide average accident rates for similar facilities. In the SB direction, 10 out of 23 ramps were reported to have actual total accident rates that are higher than the statewide average for similar facilities. Similar to the mainline, most accident types at the ramps are rear-end collisions.

1.2.3.3 Roadway Deficiencies

The I-405 corridor is currently experiencing congestion and long traffic delays during the morning (AM) and afternoon/evening (PM) peak hours because demand, primarily from local, regional, and interregional travel, exceeds capacity. As previously discussed, the current (2015) and forecast (2050) GP lane LOS on segments of I-405 through the project corridor operate at an LOS F in one or both of the AM and PM peak periods.

Table 1-5 summarizes the current and forecasted ADT volumes and weekday daily VMT for the project corridor. Travel demand along the corridor is anticipated to increase. The average weekday VMT on I-405 between I-5 and SR-55 is expected to increase almost 15 percent by the year 2050, with a similar increase of almost 15 percent by year 2050 for ADT along the project corridor. The increased demand on the already congested freeway will lead to further congestion and delay experienced by the motorists.

Table 1-5. I-405 Mainline (I-5 to SR-55) Average Daily Traffic Volumes and Vehicle Miles Traveled

	Direction	Year		
		2015	2030	2050
ADT	NB	128,070	135,587	142,718
	SB	125,679	139,225	148,466
	TOTAL	253,749	274,812	291,184
VMT	NB	1,031,220	1,091,747	1,149,167
	SB	1,000,404	1,108,232	1,181,790
	TOTAL	2,031,624	2,199,979	2,330,957

Source: Traffic Study, 2017.

The current configuration of the I-405 corridor has several current and future geometric and infrastructure deficiencies on the mainline and ramps. There are choke points along the mainline where GP lanes are dropped and capacity is reduced, resulting in congestion. The lack of lane continuity can be found at two locations on the I-405 corridor:

- In the NB direction, the fifth GP lane is dropped along the mainline after the SB SR-133 diverging loop connector. This reduction in mainline capacity, coupled with the high volume of merging traffic from SR-133, causes congestion along the mainline.
- In the SB direction, the long auxiliary lane originating at the MacArthur Boulevard on-ramp and a GP lane originating at the SR-55 connector are both dropped at the Culver Drive off-ramp, causing a bottleneck along the mainline.

Other mainline geometric deficiencies on the I-405 corridor are insufficient weave length and interchange spacing. Weaving sections along the freeway are located near ramps and freeway-to-freeway connectors where vehicles are either entering or exiting the freeway and execute one or more lane changes. Insufficient weave lengths occur at the following locations:

- The weaving movements on SB I-405 between SR-55 and Jamboree Road hinder mainline operations. Drivers originating from I-405 north of SR-55 who want to exit at the Jamboree Road interchange must make two lane changes in a relatively short 2-mile distance and merge with the high volume of vehicles merging onto I-405 from the SR-55 branch connectors and MacArthur Boulevard on-ramp, as well as the high volume of vehicles exiting at the MacArthur Boulevard off-ramp.
- The MacArthur Boulevard on-ramp adds two lanes, prompting the need for a second lane change for drivers originating north of SR-55 who wish to exit at the Jamboree Road interchange.

Besides the mainline deficiencies, some off-ramps are approaching capacity. The single-lane off-ramps in the NB direction at the Sand Canyon Avenue and MacArthur Boulevard interchanges have existing AM and PM peak-hour volumes nearing the capacity of approximately 1,500 vehicles per hour (vph), which can result in queues on the off-ramp extending back to the mainline. Similarly, in the SB direction, the single-lane exit at the Sand Canyon Avenue interchange has an existing AM peak-hour volume exceeding storage capacity and nearing the threshold for which a two-lane off-ramp would be required.

I-405 has insufficient capacity to accommodate either the existing travel demands or the increased travel demands along the I-405 corridor that will occur by the year 2050. Without infrastructure improvements, the increase in travel demand is expected to result in increased travel time, increased delays, and LOS F operating conditions on almost all freeway mainline segments, ramp junctions, and weaving segments.

1.2.3.4 Social Demands or Economic Development

The 8.5-mile-long project corridor traverses primarily through Irvine, part of Costa Mesa, and portions of unincorporated Orange County at the northern end of the corridor. Within Irvine, the I-405 corridor is in an urban setting with distinct residential, commercial, conservation open space, and urban/industrial land uses abutting the freeway.

The project study area, as well as all of southern California, has experienced dramatic growth in the last 30 years, and this trend is expected to continue. Within the SCAG region, the total population is forecast to increase almost 21 percent from 18.3 million to 22.1 million people between 2012 and 2040. During this same period, regional employment is expected to grow approximately 33 percent. Within Orange County, the population is forecast to increase approximately 13 percent from 3 million to 3.4 million people, with employment increasing approximately 24 percent between 2012 and 2040. Irvine is forecast to experience substantial population and employment growth. Between 2012 and 2040, the population of Irvine is forecast to grow 44 percent, with approximately 43 percent growth in employment (SCAG, 2016). As a result of projected regional and local growth in population and employment, the volume of traffic on I-405 is expected to increase.

Population and employment growth within the study area is expected to take place through the natural increase and redevelopment of existing land uses or infill development of vacant parcels. Land uses within the study area are already established, with limited opportunity for a new unanticipated large-scale development.

The project is consistent with the state, regional, and local programs, plans, and policies, including the SCAG 2016-2040 RTP/SCS, OCTA 2014 Long Range Transportation Plan, OCTA 2015 Orange County Congestion Management Program, Orange County General Plan, and general plans of the local jurisdictions that comprise the project study area. The roadway improvements associated with the project are anticipated to improve freeway capacity and travel times and accommodate existing and future travel demand in the corridor related to existing and planned growth approved by local jurisdictions.

1.2.3.5 Legislation

In 1990, Orange County voters approved M1, a one-half cent sales tax for a 20-year period, which was designated for transportation improvements throughout the county. In November 2006, Orange County voters approved renewal of the Measure M one-half cent sales tax. With approval of M2, the voters agreed to a continued investment of local tax dollars in Orange County's transportation infrastructure for another 30 years to 2041. Since the inception of

Measure M, more than $4 billion in transportation improvements have been implemented in Orange County.

The Measure M2 *Next 10 Delivery Plan* provides guidance for what can be accomplished over the 10 years between 2017 and 2026. The GP lane additions and interchange improvements of the proposed project are included in the *Next 10 Delivery Plan* as Project L.

In addition, Measure M2 includes the allocation of funds to acquire land and fund restoration projects as part of the mitigation efforts and streamlined approval process for 13 M2 freeway improvement projects. To guide the restoration efforts, OCTA developed a Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP).

1.2.3.6 Modal Interrelationships and System Linkages

National Highway System Linkage

I-405 is a major north-south route that traverses portions of Los Angeles and Orange counties. It begins at the junction with I-5 in Irvine and ends at the junction with I-5 in the San Fernando Valley region of Los Angeles. I-405 is used for international, interstate, interregional and intraregional travel and shipping with proximity to major import-export terminals including Los Angeles International Airport and the ports of Long Beach and Los Angeles.

I-405 is part of the Federal Aid Interstate (FAI) system, which is a subset of the NHS. The functional classification for I-405 is P1P (Urban Principle Arterial). I-405 is a major truck route and is part of the federal Surface Transportation Assistance Act (STAA) route network for oversized trucks and the Subsystem of Highways for the Movement of Extra-Legal Loads (SHELL) and it is also a part of the Strategic Highway Network (STRAHNET). STRAHNET is the nationwide system of highways within the NHS that may be used to transport personnel and equipment in emergencies. I-405 serves as a part of the California Intermodal Corridors of Economic Significance (ICES) with its connections to the major sea ports and airports of the region (California Streets and Highways Code Section 2190).

Regional System Linkage

The I-405 corridor provides an essential transportation and economic link for Los Angeles and Orange County. At approximately 72 miles long, I-405 serves as a bypass for I-5 by running through the western and southern parts of the Los Angeles region. The route links to several freeways, including I-5, SR-118, US 101, I-10, SR-90, I-105, I-110, I-710, I-605, SR-22, SR-55, and SR-133. Within the project corridor segment of I-405, the major regional linkages include SR-55, SR-133, and I-5.

Local System Linkage

In addition to serving as a major regional transportation route, I-405 is used for local access in Irvine within the project corridor. I-405 provides access to several major attractions, including John Wayne Airport; University of California, Irvine; Laguna Coast Wilderness Park; and Irvine Spectrum Center retail center.

Modal Relationships

As previously discussed, I-405 is identified as part of the ICES system of routes, which are primary transportation arteries that provide access to major sea or waterway ports, national railway systems, airports, and other interstate and intrastate highway systems. I-405 serves three airports: Los Angeles International Airport, Long Beach Municipal Airport, and John Wayne Airport in the study area. In addition, I-405 is located approximately 5 miles north of the ports of Los Angeles and Long Beach and provides a corridor for movement of freight within the region.

There are no rail connections or rail lanes within or adjacent to the segment of I-405 in the project corridor. OCTA bus routes 211, 212, and 216 all include a portion of I-405. There are no plans at this time to add or modify transit facilities within the project limits as a component of the project. However, improvements to the mainline capacity would provide transit benefits by potentially reducing the travel time of any transit route that is programmed or has future plans to use this portion of the I-405 mainline.

1.2.3.7 Air Quality Improvements

Within the project corridor, HOV lanes and ramp metering have been incorporated into I-405 as transportation control measures. There is one HOV lane in the NB and SB directions of I-405 throughout the entire length of the project corridor from I-5 to SR-55. All of the existing on-ramps within the project corridor are metered to optimize their operation during peak periods.

OCTA offers several programs designed to encourage the use of alternate modes of transportation or more efficient use of vehicles. OCTA provides assistance in forming, joining, and managing ride-sharing and vanpool programs, in addition to providing commuter and local bus services and commuter rail services.

The city of Irvine operates two separate shuttle transit services, which operate between John Wayne Airport, Irvine Business Complex, and the Tustin Metrolink Station crossing I-405 via Von Karman Avenue and Harvard Avenue.

Numerous bicycle facilities run adjacent to or cross I-405 within the project corridor. The Freeway Trail is a Class I bike path (off-road, paved) that runs along the east side of I-405 between San Diego Creek and Sand Canyon Avenue. The Juanita Moe Trail and Bikeway runs along the west side of I-405 between University Drive and Sand Canyon Avenue. Other Class I bike paths crossing I-405 include the San Diego Creek Trail, Yale Bridge, and Jefferson Pedestrian Bridge. Class II bike lanes (on-street, paved) are located along several streets crossing I-405, including Harvard Avenue, Culver Drive, Jeffrey Road, and Sand Canyon Avenue.

Alternatives 2 and 3 would include modifications to the existing lane configuration with the addition of GP lanes and auxiliary lanes in addition to on- and off-ramp improvements within the corridor. The freeway improvements would help improve traffic flow throughout the corridor and contribute to air quality emission reductions in the long term.

1.2.3.8 Independent Utility and Logical Termini

A transportation project is required by FHWA (23 *Code of Federal Regulations* [CFR] 771.111) to meet standards that establish a project's "independent utility" and "logical termini." For a project to have "independent utility," it must be usable and a reasonable expenditure, even if no additional transportation improvements are made in the area. Regardless of other actions, the project must offer transportation benefits that "stand alone" and are not dependent on the implementation of other projects. Additionally, to be considered of independent utility, a project must not preclude other potential transportation projects from being implemented in the future.

This Initial Study/Environmental Assessment (IS/EA) assesses the operational conditions on I-405 between PM 0.2 and 8.7. This area covers a segment of I-405 through Irvine that is an urban setting with distinct residential, commercial, conservation/open space, and urban/ industrial land uses abutting the freeway. The approximately 8.5-mile-long corridor begins at the southern end of I-405 where it connects to I-5 and terminates at the I-405/SR-55 interchange in Costa Mesa. Both end points of the proposed project are at intersections with major regional transportation facility interchanges, which serve as logical points of termination. The project corridor is of sufficient length to adequately address the transportation issues that have been identified.

Independent Utility

The proposed project satisfies FHWA's regulations for "independent utility" because it would not prevent the implementation of future transportation projects, and, independent of other actions, it would also provide benefits to I-405 according to the project's purpose and need.

This project would provide GP lanes to address existing and future traffic demand, address congestion, and enhance freeway operations. This benefit would be provided by the project and would not require the completion of any other projects.

Logical Termini

"Logical termini" are required for project development to establish project boundaries that allow for a comprehensive response to transportation deficiency. Rational end points are required for transportation improvements and the review of environmental impacts.

There is a demonstrated need for improvements between I-5 and SR-55 due to extensive peak-period congestion that currently exists and is forecast to become worse over time. The project area adequately addresses transportation issues on I-405 and would not force immediate transportation improvements on the remainder of the facility.

1.3 Project Description

The project corridor is located primarily in the city of Irvine in Orange County; north of MacArthur Boulevard, I-405 traverses unincorporated Orange County and the city of Costa Mesa and is approximately 8.5 miles long. Within the project corridor, I-405 is a controlled-access freeway with 8 to 10 mixed-flow GP lanes, 2 high-occupancy vehicle (HOV) lanes, 6 local interchanges, and 3 freeway-to-freeway interchanges at I-5, SR-133, and SR-55. The proposed project build alternatives would reduce congestion and improve operational efficiency on I-405 between I-5 and SR-55 by adding one or two GP lanes and auxiliary lanes.

1.4 Alternatives

The evaluation of project alternatives included an assessment of traffic LOS and other congestion-relief performance criteria, environmental impacts, and effectiveness in addressing the project's purpose and need. Two build alternatives – adding one GP lane (Alternative 2 [Preferred Alternative]) and adding two GP lanes (Alternative 3) – and a No Build Alternative (Alternative 1) are being considered for the I-405 Improvement Project (I-5 to SR-55). The build alternatives propose construction of one or two GP lanes along I-405 between I-5 and SR-55. Figures 1-4 and 1-5 show a schematic presentation of the lane configurations associated with each alternative. Detailed exhibits of each alternative, including typical sections and conceptual layout plans, are provided in Appendix G.

1.4.1 Build Alternatives

1.4.1.1 Common Design Features of the Build Alternatives

Alternatives 2 and 3 would both add a single NB GP lane between SR-133 and Culver Drive and a single SB GP lane between Irvine Center Drive and University Drive/Jeffrey Road. These changes would create a fifth continuous GP lane from SR-133 to SR-55 in the NB direction and from the Bake Parkway SB off-ramp (near I-5) to SR-55 in the SB direction. The proposed improvements under the alternatives include mainline widening, restriping of the HOV lanes, ramp reconstruction or widening, and construction of auxiliary lanes where required based on traffic merge, diverge, and weaving operational analysis and geometric conditions.

Additionally, each build alternative would include the following features:

Mainline Improvements

- Mainline pavement widening in the median from the Irvine Center Drive interchange to the Culver Drive interchange
- Restriping HOV lanes to continuous access from the Irvine Center Drive interchange to the MacArthur Boulevard interchange
- The travel lanes on the I-405 mainline would be 12 feet wide and shoulders would be 10 feet wide
- Maintenance vehicle pullouts would be included in various locations under each build alternative
- The build alternatives would require modification of existing stormwater drainage channels and culverts and construction of new drainage or retention facilities necessary to accommodate project construction and provide sufficient drainage capacity to accommodate future runoff volumes generated with the build alternative in place
- Each build alternative would add water quality Best Management Practices (BMPs)
- Landscaping and hardscaping elements would be included with each build alternative
- Two unidirectional California Highway Patrol (CHP) observation areas (one NB and one SB) would be added in the median of I-405 between Yale Avenue and Jeffrey Road

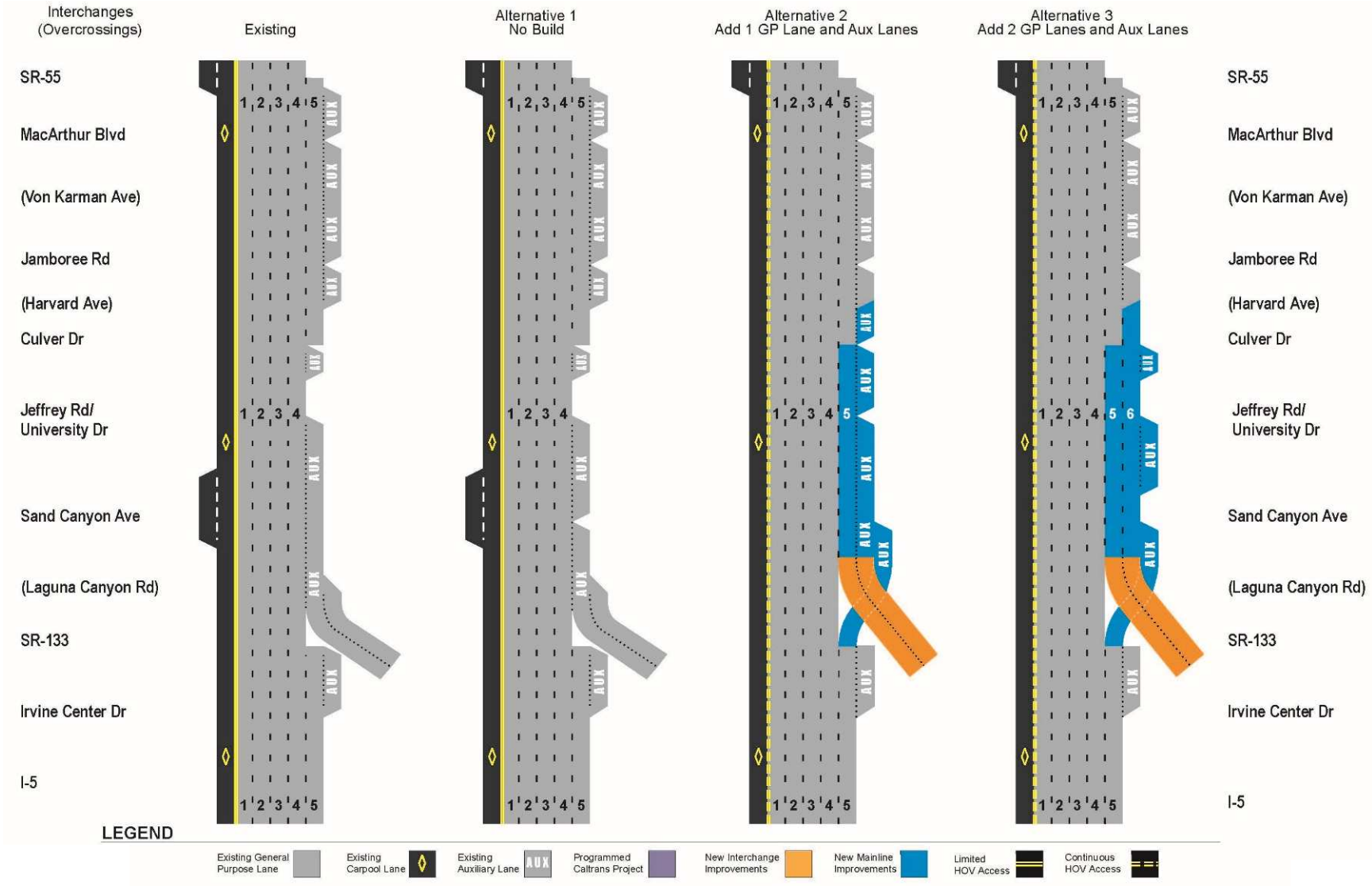


Figure 1-4. Project Alternatives Lane Schematics – Northbound

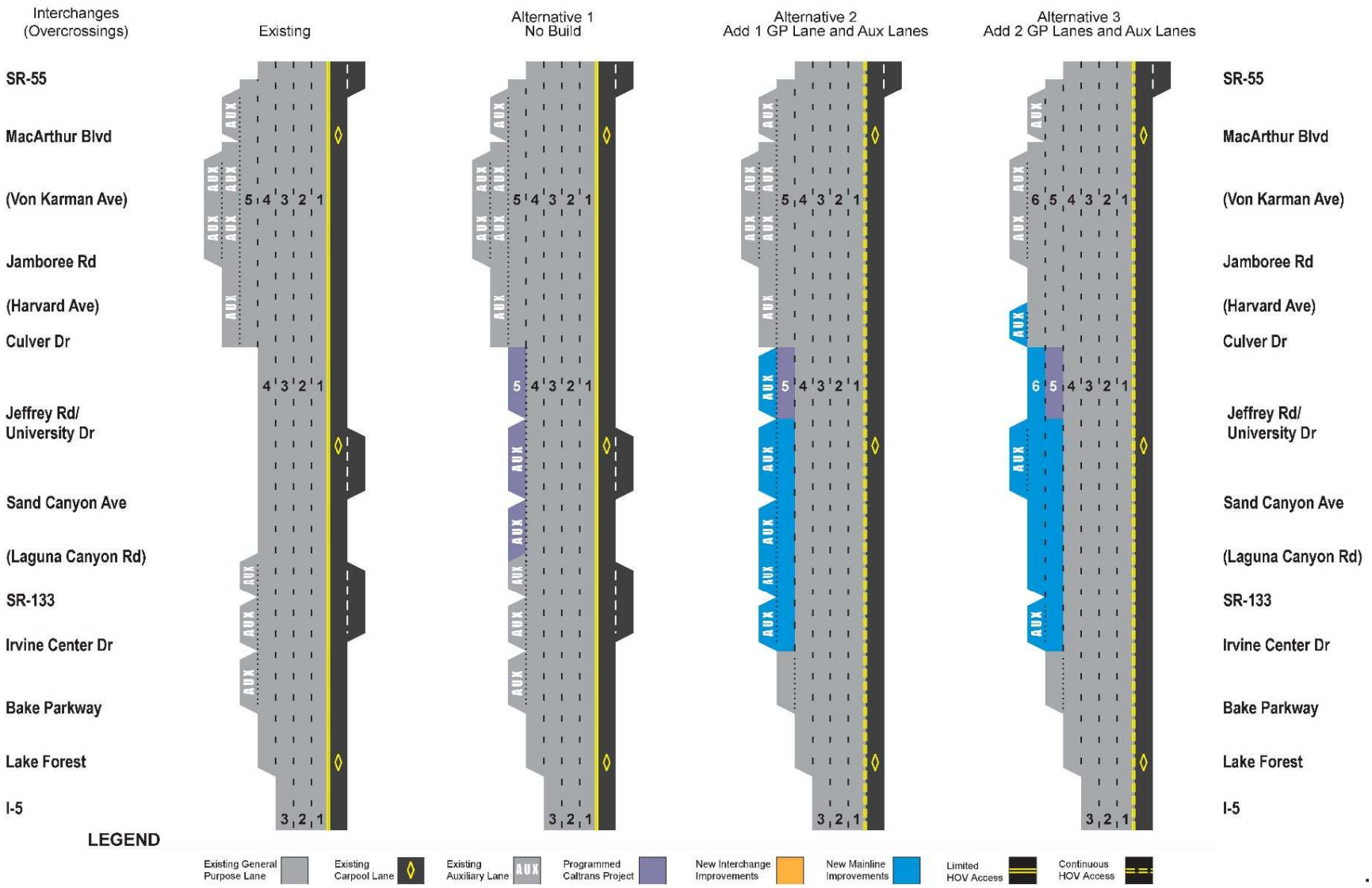


Figure 1-5. Project Alternatives Lane Schematics – Southbound

Interchange Improvements

Both alternatives would require reconstruction of several freeway-to-freeway connectors and local interchange ramps to accommodate the I-405 widening. Table 1-6 provides a summary of ramp improvements that are required in Alternative 2. Notable improvements are also listed below:

- Modify one-lane off-ramps to two-lane off-ramps at the following locations:
  - NB I-405 off-ramp to Shady Canyon Drive/Sand Canyon Avenue
  - NB I-405 off-ramp to MacArthur Boulevard
  - SB I-405 off-ramp to SR-133
- Construct new braided ramps between the NB I-405 off-ramp to Shady Canyon Drive/Sand Canyon Avenue and the on-ramp from SR-133 to NB I-405
- Merge the SB collector-distributor road at the SR-133 interchange into the freeway mainline upstream of the entrance ramp from NB SR-133, thereby providing two entrance ramp junctions with the SB I-405 mainline

Table 1-6. Interchange Ramp Improvements Common to Both Build Alternatives

Interchange along I-405	Ramp Type	Line	Proposed Ramp Work
NORTHBOUND			
Irvine Center Drive/ Entertainment/ Enterprise Drive	NB Off Direct	"IC4"	No work
	NB On Direct (Truck Bypass)	-	No work
	NB On Loop	"IC8"	No work
	NB On Direct	"IC1"	No work
SR-133	NB Off Loop (N405-S133)	"N405-S133"	Reconstruct (partial)
	NB Off (Truck Bypass)	"SC4-BYPASS"	Reconstruct
	NB On Direct (from SB SR-133)	"S133-N405"	Reconstruct (partial)
	NB On Direct (from NB SR-133)	"N133-N405"	Reconstruct (partial)
Shady Canyon Drive/ Sand Canyon Avenue	NB Off Direct	"SC4"	Reconstruct
	NB On Loop	"SC8"	No work
	NB On Direct	"SC1"	No work
University Drive/ Jeffrey Road	NB Off Direct	"JE4"	See Section 1.4.1.2, Unique Features of the Build Alternatives
	NB On Loop	"JE8"	
	NB On Direct	"JE1"	

Table 1-6. Interchange Ramp Improvements Common to Both Build Alternatives

Interchange along I-405	Ramp Type	Line	Proposed Ramp Work
Culver Drive	NB Off Direct	"CU4"	Reconstruct (partial)
	NB On Loop	"CU5"	Reconstruct
	NB On Direct	"CU6"	Reconstruct
Jamboree Road	NB Off Direct	"JA4"	No work
	NB On Loop	"JA5"	No work
	NB On Direct	"JA6"	No work
MacArthur Blvd	NB Off Direct	"MA3"	Reconstruct (partial)
	NB On Loop	"MA4"	No work
SOUTHBOUND			
Irvine Center Drive/ Entertainment/ Enterprise Drive	SB Off Direct	"IC2"	Reconstruct
	SB On Loop	"IC6"	Reconstruct
	SB On Direct	"IC3"	No work
SR-133	SB Off Direct CD	"S405-CD"	Reconstruct (partial)
	SB Off Direct to SB SR-133	"S405-S133"	Reconstruct (partial)
	SB On Loop to CD	"S133-S405"	No work
	SB Off Loop from CD	"S405-N133"	No work
	SB On Direct	"N133-S405"	Reconstruct (partial)
Shady Canyon Drive/Sand Canyon Avenue	SB Off Direct	"SC2"	No work
	SB On Loop	"SC6"	No work
University Drive/ Jeffrey Road	SB Off Direct	"JE2'	No work
	SB On Loop	"JE6"	No work
	SB On Direct	"JE3"	No work
Culver Drive	SB Off Direct	"CU1"	See Section 1.4.1.2 Unique Features of the Build Alternatives
	SB On Loop	"CU2"	
	SB On Direct	"CU3"	
Jamboree Road	SB Off Direct	"JA1"	Reconstruct (partial)
	SB On Loop	"JA2"	No work
	SB On Direct	"JA3"	No work
MacArthur Boulevard	SB Off Loop	"MA1"	No work
	SB On Direct	"MA2"	No work

Source: Parsons, 2018.

Structure Improvements

Both alternatives would necessitate construction of one new braided ramp structure, widening of two existing bridges over San Diego Creek Channel, and construction of ground anchor walls at three structures, as summarized in Table 1-7.

Table 1-7. Structure Improvements Common to Both Build Alternatives

No.	PM	Structure Name	Bridge No.	Proposed Work
1	0.45	S5-Bake Parkway Off/405 Separation	55-0739K	No work
2	0.49	N5-Irvine Center/Bake-N405	55-0740S	No work
3	0.95	Irvine Center Drive Overcrossing (OC)	55-0442	No work
4	1.50	San Diego Creek Channel Bridge (South)	55-0451	Widen NB side (695 square feet)
5	1.71	N133-N405/405 Connector Separation	55-0452G	Construct ground anchor wall (1,588 square feet)
6	1.79	N133/405 Separation	55-0246R	No work
7	1.81	S133/405 Separation	55-0246L	No work
New	1.96	N133/S133-N405 Connector OC	55-xxxx	New braided ramp structure (14,850 square feet)
8	2.03	Laguna Channel	55-0520	No work
9	2.20	Laguna Canyon Road OC	55-0247	Construct ground anchor wall (1,032 square feet)
10	2.88	Sand Canyon Avenue OC	55-0443	No work
11	3.55	Jeffrey Trail POC	55-1055	No work
12	3.95	University Drive OC	55-0248	No work
13	4.24	San Joaquin Channel	55-0521	No work
14	4.67	Yale Avenue Pedestrian Overcrossing (POC)	55-0639	No work
15	5.62	Culver Drive OC	55-0249	See Section 1.4.1.2, Unique Features of the Build Alternatives
16	6.13	San Joaquin Channel	55-0522	No work
17	6.20	Harvard Avenue OC	55-0630	No work
18	6.41	San Diego Creek Channel Bridge (North)	55-0285	Widen NB side (3,862 square feet)
19	6.86	Lane Channel	55-0523S	No work
20	6.92	Jamboree Road OC	55-0250	No work
21	7.40	Von Karman Avenue OC	55-0612	No work
22	7.80	MacArthur Boulevard OC (Left)	55-0440L	No work

Table 1-7. Structure Improvements Common to Both Build Alternatives

No.	PM	Structure Name	Bridge No.	Proposed Work
23	7.80	MacArthur Boulevard OC (Right)	55-0440R	No work
24	7.84	Airport-N55 OC	55-0669S	No work
25	8.40	Redhill Avenue OC	55-0959	No work

Drainage Improvements (Major Structures)

It is anticipated that existing inlets would have to be upgraded to accommodate higher discharges and/or additional inlets added. The roadway widening would also require relocation of existing inlets to the new edge of pavement. In addition, several major drainage structures along the project corridor are anticipated to require modifications/improvements, as summarized in Table 1-8.

Table 1-8. Drainage Improvements Common to Both Build Alternatives

No.	Channel Name	Approximate Station	Type of Existing Facility	Proposed Work
1	San Diego Creek Channel Reach 2 (south of SR-133)	"A" Line Sta 119+35	Bridge No. 55-0451	Widen bridge (NB side) (695 square feet)
2	Channel F05S03 (north of SR-133)	"A" Line Sta 147+50	Double 12' x 6' reinforced concrete box (RCB)	*Protect in place
3	San Joaquin Channel (across University Drive)	"JEF1" Line Sta 22+75	Double 10' x 8' RCB	Protect in place
4	San Joaquin Channel (north of University Drive/Jeffrey Road)	"A" Line Sta 263+50	Triple 10' x 7' RCB	*Protect in place
5	Culver Storm Channel (across Culver Drive)	"A" Line Sta 30+00	5' x 5' RCB	*Protect in place
6	San Joaquin Channel (south of Harvard Avenue)	"A" Line Sta 363+50	Triple 12' x 9' RCB	Extend culvert upstream (and potentially downstream) and modify inlet/outlet headwalls
7	San Diego Creek Channel Reach 1 (south of Jamboree Road)	"A" Line Sta 380+00	Bridge No. 55-0285	Widen bridge (NB side) (3,862 square feet)
8	Lane Channel (across Jamboree Road)	"A" Line Sta 405+00	Triple 12' x 12' RCB	*Protect in place
9	Unnamed culvert (north of Jamboree Road)	"A" Line Sta 419+50	8' x 10' RCB	Protect in place

Table 1-8. Drainage Improvements Common to Both Build Alternatives

No.	Channel Name	Approximate Station	Type of Existing Facility	Proposed Work
10	Unnamed culvert (north of Von Karman Avenue)	"A" Line Sta 435+00	6' x 6' RCB	Protect in place
11	Airport Storm Channel (along SB I-405, south of Redhill Avenue)	"A" Line Sta 476+00 to Sta 494+00	12' x 8' Rectangular Channel	Protect in place
Notes: *This drainage facility is identified in the Project's Preliminary Drainage Report (October 2015) as requiring modifications or improvements; however, upon further refinement of the project geometrics, it is determined that modification/improvement is not required and can be protected in place.				

Source: Preliminary Drainage Report, October 2015.

Right-of-way Acquisition

Both alternatives would primarily be constructed within the existing State ROW, although both alternatives would require partial fee acquisition of 850 square feet (0.02 acre), as well as TCEs of 0.06 acre from one commercial property located on two APNs(466-083-13 and 466-083-14) adjacent to I-405 just south of Laguna Canyon Road to accommodate the NB Sand Canyon Road bypass off-ramp. The area subject to partial fee acquisition is generally the back slope of the parking lot serving this commercial property. The partial fee acquisition would affect a small sliver of landscaping and a concrete v-ditch within a property improved with a bank building adjacent to the existing State right of way (I-405) limits. No existing parking spaces would be removed because of this partial fee acquisition. In addition, TCEs would be required from four properties located on seven APNs to construct the proposed improvements.

Soundwalls

The project proposes construction of two soundwalls to provide noise abatement for impacted receivers located along the corridor. The proposed soundwalls are located at:

- The ROW along SB I-405 at the University Drive off-ramp (new Soundwall S255), with length and average height of 660 and 16 feet, respectively.
- The ROW along NB I-405 at the Culver Drive off-ramp (new Soundwall S322 – Option 1), with length and average height of 2,132 and 16 feet, respectively.

Utilities

Each build alternative would require relocation of two power poles within an existing Southern California Edison (SCE) easement that extends across I-405 adjacent and parallel to the east

side of the Laguna Canyon Road overcrossing. There are two existing concrete encasements housing underground AT&T telephone lines that would extend on both the north and south sides of the freeway on the west side of the Laguna Canyon Road overcrossing. Additional concrete encasement extension work would be required for a PacTel line that crosses under I-405 west of the Jamboree Road overcrossing. In addition, it is anticipated that the encasements for two Irvine Ranch Water District sewer crossings would need to be extended.

Retaining Walls

Proposed retaining wall locations and lengths would be as follows.

- Irvine Center Drive SB off-ramp (588-foot length)
- Laguna Canyon Road SB Overcrossing (45-foot length)
- N133-N405 Connector (80-foot length) (Sta 130+00 – 132+00)
- N405-S133 Connector (300-foot length) (Sta 141+00 – 144+00)
- N133-N405 Connector (600-foot length) (Sta 147+35 – 153+35)
- Culver Drive NB off-ramp (1,400-foot length) (combined with soundwall)
- Culver Drive NB loop on-ramp (200-foot length)
- S133-N405 Connector (1,100-foot length) (Sta 132+00 – 143+00)

Construction Staging and Import/Borrow Sites

At this time, there are no suitable construction staging areas identified, nor suitable import and borrow sites identified. Locations will be evaluated during future stages of the project.

1.4.1.2 Unique Features of the Build Alternatives

Alternative 2 (Build – One General Purpose Lane in Each Direction) (Preferred Alternative)

Typical sections and conceptual layout plans for the proposed Alternative 2 improvements are provided in Appendix G.

The engineering features unique to Alternative 2 are summarized as follows:

Mainline Improvements

- Reestablish existing NB auxiliary lanes between SR-133 and University Drive/Jeffrey Road
- Add an NB auxiliary lane between University Drive/Jeffrey Road and Culver Drive

- Add an NB auxiliary lane at Culver Drive to join the existing auxiliary lane preceding the Jamboree Road NB off-ramp
- Reestablish existing SB auxiliary lanes between Irvine Center Drive and University Drive/ Jeffrey Road, including the SB auxiliary lanes between S405-S133 Connector and Culver Drive that are included in Alternative 1 (No Build)
- Add an SB auxiliary lane between University Drive/Jeffrey Road and Culver Drive

Interchange Improvements

- Reconstruct a portion of the NB I-405 exit to Jeffrey Road to accommodate mainline widening
- Reconstruct the Jeffrey Road NB loop-on ramp to accommodate mainline widening
- No work proposed at the SB I-405 ramps at Culver Drive

Structure Improvements

Alternative 2 proposes to construct a 2,732-square-foot ground anchor wall at the Culver Drive Overcrossing (OC).

Retaining Walls

The location and length of one additional proposed retaining wall would be as follows.

- Laguna Canyon Road NB Overcrossing (34-foot length)

Cost Estimate

The cost for Alternative 2 is estimated at $131 million in current dollars or $176 million in the future expenditure years.

Alternative 3 (Build – Two General Purpose Lanes in Each Direction)

Alternative 3 proposes to add an additional NB GP lane from SR-133 to Jamboree Road and an additional SB GP lane from SR-133 to Culver Drive. These changes would create a sixth continuous NB GP lane between SR-133 to Jamboree Road and a sixth continuous SB lane between SR-133 and MacArthur Boulevard. Typical sections and conceptual layout plans for the proposed Alternative 3 improvements are provided in Appendix G.

The engineering features unique to Alternative 3 are summarized as follows:

Mainline Improvements

- Add a second NB GP lane from SR-133 to Jamboree Road
- Reestablish existing NB auxiliary lane from Shady Canyon Drive/Sand Canyon Avenue to University Drive/Jeffrey Road
- Reestablish existing NB auxiliary lane upstream of Culver Drive
- Add a second SB GP lane from SR-133 to Culver Drive
- Reestablish existing SB auxiliary lane between Irvine Center Drive and SR-133
- Reestablish existing SB auxiliary lane between Shady Canyon Drive/Sand Canyon Avenue and University Drive/Jeffrey Road
- Add an SB auxiliary lane upstream of the I-405 off-ramp to Culver Drive

Interchange Improvements

- Reconstruct and add a lane to the NB I-405 Jeffrey Road direct on-ramp
- Realign and add a lane to the SB Culver Drive direct on-ramp to accommodate the mainline widening
- Realign and add a lane to the SB I-405 Culver Drive loop on-ramp

Structure Improvements

Alternative 3 proposes to construct a 3,331-square-foot ground anchor wall at the Culver Drive OC.

Retaining Walls

Locations and lengths of three additional proposed retaining walls would be as follows.

- Culver Drive SB on-ramp (170-foot length)
- Laguna Canyon Road NB Overcrossing (72-foot length)
- Jeffrey Road NB off-ramp (324-foot length)

Cost Estimate

The cost for Alternative 3 is estimated at $151 million in current dollars or $199 million in the future expenditure years.

1.4.2 Alternative 1 (No Build Alternative)

The No Build Alternative would maintain the existing configuration of the I-405 corridor with no additional lanes or interchange improvements to be provided. The existing configuration would not accommodate the future traffic demand. Congestion along the corridor would not be alleviated, and the condition would deteriorate with time. Because there are no improvements anticipated within the project limits, there are no construction or ROW costs associated with this alternative.

The configuration under the No Build Alterative assumes completion of two projects that are currently programmed by Caltrans in the State Highway Operations and Protection Program (SHOPP), State Transportation Improvement Program (STIP), or Corridor Mobility Improvement Account (CMIA). This includes the construction of an SB auxiliary lane between SR-133 and the Sand Canyon Avenue on-ramp, another between the Sand Canyon Avenue off-ramp and the University Drive on-ramp, and the extension of one SB lane between the University Drive off-ramp and the Culver Drive off-ramp.

The freeway mainline for Alternative 1 in the NB direction consists of five GP lanes with auxiliary lanes on some segments between I-5 and SR-133 and between Culver Drive and SR-55. The freeway mainline between SR-133 and Culver Drive consists of four GP lanes with auxiliary lanes on some segments. In the SB direction, the freeway mainline consists of five GP lanes with auxiliary lanes on some segments between SR-55 and Jeffrey Road/University Drive. Between Jeffrey Road/University Drive and Lake Forest Drive, the freeway mainline consists of four GP lanes with auxiliary lanes on some segments and three GP lanes south of the Lake Forest Drive exit ramp. The Alternative 1 freeway mainline also includes one HOV lane in each direction from I-5 to SR-55.

Describing and analyzing a No Build Alternative helps decision makers and the public compare the impacts of approving the project with the consequences of not approving the project.

1.4.3 Comparison of Alternatives

The comparison of alternatives is based on their ability to meet the project purpose and need and ultimately provide some improvement to traffic operations on I-405 through the project corridor.

Alternative 1 does not comprehensively address the I-405 deficiencies and fails to satisfy this project's purpose and need. Existing and forecasted LOS F conditions in the corridor would get worse with implementation of Alternative 1. Bottlenecks that are caused by poor lane continuity and high-volume on-ramp merges would persist.

Alternatives 2 and 3 meet the project purpose and need. Both alternatives add to the mainline capacity and improve ramp capacity within the project corridor. The improvements associated with each alternative help reduce corridor congestion and improve freeway operations. With the inclusion of an additional GP lane, Alternative 3 would show slight traffic operation improvements over Alternative 2. The average peak-hour speed and vehicle hours of delay are more favorable under Alternative 3. In addition, there are fewer mainline segments and ramps operating at LOS F with Alternative 3 compared to Alternative 2. The minimization of environmental impacts was also considered. Table 1-9 compares the alternatives for this project.

After the public circulation period, all comments were considered, and Caltrans and OCTA selected a preferred alternative and made the final determination of the project's effect on the environment. Under CEQA, no unmitigable significant adverse impacts were identified, and Caltrans has prepared a Mitigated Negative Declaration. Similarly, Caltrans, as assigned by the FHWA, determined the NEPA action does not significantly impact the environment and issued a Finding of No Significant Impact (FONSI).

Table 1-9. Comparison of Alternatives

Evaluation Criteria	Alternative 1 (No Build)	Alternative 2 (Preferred Alternative)	Alternative 3
Land Use	• Generally not consistent with land use plans	• 2 parcels would be impacted by partial fee acquisition/permanent impact (0.02 acre) and by TCEs (0.06 acre). • 7 parcels would be impacted by TCEs (0.64 acre). • Generally consistent with land use plans Partial fee acquisition of 850 square feet (0.02 acre) from one commercial property located on 2 APNs (466-083-13 and 466-083-14) adjacent to I-405 just south of Laguna Canyon Road to accommodate the NB Sand Canyon Road bypass off-ramp, requiring modification of land use from commercial to transportation • No permanent impacts to parks or recreational facilities • Temporary Construction Impact – Temporary Bike Trail Closures; however, detours will be provided	• 2 parcels would be impacted by partial fee acquisition/permanent impact (0.02 acre) and by TCEs (0.06 acre). • 7 parcels would be impacted by TCEs (0.89 acre). • Generally consistent with land use plans, but to a lesser degree than Alternative 2 and requires an update to the STIP, RTP/SCS and SCAG FTIP Partial fee acquisition of 850 square feet (0.02 acre) from one commercial property located on 2 APNs (466-083-13 and 466-083-14) adjacent to I-405 just south of Laguna Canyon Road to accommodate the NB Sand Canyon Road bypass off-ramp, requiring modification of land use from commercial to transportation • No permanent impacts to parks or recreational facilities • Temporary Construction Impact – Temporary Bike Trail Closures; however, detours will be provided
Growth	• The SCAG RTP/SCS and other Regional planning documents anticipated the growth planned within the local jurisdictions within Orange County. Alternative 1 is not consistent with this planned growth	• The project type and location do not influence growth • Growth pressure can affect existing and future travel demand; however, the project is anticipated to accommodate this demand and the growth planned by local jurisdictions • Project-related growth is not reasonably foreseeable; improvements would remain primarily within existing freeway ROW • This alternative would not change access but would instead facilitate improved mobility	• The project type and location do not influence growth • Growth pressure can affect existing and future travel demand; however, the project is anticipated to accommodate this demand and the growth planned by local jurisdictions • Project-related growth is not reasonably foreseeable; improvements would remain primarily within existing freeway ROW • This alternative would not change access but would instead facilitate improved mobility
Farmlands	• No Impacts	• No Impacts	• No Impacts
Community Impacts	• The sense of place and community character would be affected by worsening congestion for adjacent neighborhood residents, possibly impacting homeownership and/or occupancy • Potential indirect impacts to the regional economy and/or business activity could result from the continued degradation of traffic flow and capacity associated with congestion • Without the proposed improvements, congestion would continue to worsen for environmental justice populations and non-environmental justice populations	• This alternative would bring residents and businesses closer to the freeway; however, this would not affect community character and cohesion because the freeway is already an existing facility • Because I-405 is an existing transportation facility, this alternative would not divide any existing neighborhoods or communities • 2 parcels would be impacted by partial fee acquisition/permanent impact (0.02 acre) and by TCEs (0.06 acre). • 7 parcels would be impacted by TCEs (0.64 acre). • This alternative does not result in displacements, adverse land use, housing, or community long-term impacts, or impacts to public and community facilities • This alternative does not create, relocate, or remove any existing origins or destinations such as housing, employment centers, or retail centers • Temporary Construction Impact – Construction includes activities that would temporarily generate noise and dust, involve vegetation/tree removal, and require temporary road detours/closures • Temporary Construction Impact – Due to the time required for tree maturity, the area adjacent to I-405 primarily between the Sand Canyon Avenue OC to the San Diego Creek Channel south of Jamboree Road may experience a temporary impact to community character with the removal, replacement, and reestablishment of 181 trees • Temporary Construction Impact – Emergency Services and Community character could be temporarily affected due to road detours/closures; however, a Transportation Management Plan would reduce construction-related impacts	• This alternative would bring residents and businesses closer to the freeway; however, this would not affect community character and cohesion because the freeway is already an existing facility • Because I-405 is an existing transportation facility, this alternative would not divide any existing neighborhoods or communities • 2 parcels would be impacted by partial fee acquisition/permanent impact (0.02 acre) and by TCEs (0.06 acre). • 7 parcels would be impacted by TCEs (0.89 acre). • This alternative does not result in displacements, adverse land use, housing, or community long-term impacts, or impacts to public and community facilities • This alternative does not create, relocate, or remove any existing origins or destinations such as housing, employment centers, or retail centers • Temporary Construction Impact – Construction includes activities that would temporarily generate noise and dust, involve vegetation/tree removal, and require temporary road detours/closures • Temporary Construction Impact – Due to the time required for tree maturity, the area adjacent to I-405 primarily between the Sand Canyon Avenue OC to the San Diego Creek Channel south of Jamboree Road may experience a temporary impact to community character with the removal, replacement, and reestablishment of 217 trees • Temporary Construction Impact – Emergency Services and Community character could be temporarily affected due to road detours/closures; however, a Transportation Management Plan would reduce construction-related impacts
Utilities/Emergency Services	• No additional effect on the environment	• Requires the extension of concrete encasements for existing utilities at two locations	• Requires the extension of concrete encasements for existing utilities at four locations

Table 1-9. Comparison of Alternatives

Evaluation Criteria	Alternative 1 (No Build)	Alternative 2 (Preferred Alternative)	Alternative 3
Traffic and Transportation/Pedestrian and Bicycle Facilities	• Roadway congestion would continue to worsen • No improvement to traffic operations • Speeds can be reduced up to 13 mph during peak hours • LOS F for 9 of the 14 segments • Approximately 9,000 to 14,300 vehicle hours of delay on I-405 within the study area on a typical weekday, for Year 2030 and Year 2050, respectively	• Improved LOS and average speed in GP and HOV lanes • One GP lane and auxiliary lanes added, leading to improved operations • Speeds can be increased between 10 and 14 mph during peak hours • LOS F for 8 of the 14 mainline segments • Approximately 7,400 to 9,400 vehicle hours of delay on I-405 within the study area on a typical weekday, for Year 2030 and Year 2050, respectively	• Improved LOS and average speed in GP and HOV lanes • Two GP lanes and auxiliary lanes added, leading to improved operations • Speeds can be increased between 12 and 16 mph during peak hours • LOS F for 3 of the 14 mainline segments • Approximately 6,400 and 9,200 vehicle hours of delay on I-405 within the study area on a typical weekday, for Year 2030 and Year 2050, respectively
Visual/Aesthetics	• No Impacts	• Requires the temporary removal of 236 trees (to be replaced after project construction) • 181 of the 236 trees are adjacent to primarily residential areas	• Requires the temporary removal of 272 trees (to be replaced after project construction) • 217 of the 272 trees are adjacent to primarily residential area
Cultural Resources	• No Impacts	• No Impacts	• No Impacts
Hydrology and Floodplains	• No Impacts	• Floodplain encroachments on the San Diego Creek Channel to accommodate the widening of Bridge No. 55-0285 at Reach 1 and Bridge No. 55-0451 at Reach 2 • Construction within five floodplains • San Diego Creek Channel (Reach 1) – Bridge widening along NB I-405 (upstream end) • San Joaquin Channel (Harvard) – Protect in place • Culver Storm Channel – Extend culvert at the upstream end and modify inlet headwall • San Joaquin Channel (Jeffrey) – Culvert extensions and inlet/outlet modifications may be required • San Joaquin Channel (Sand Canyon) – Protect in place • Channel F05S03 – Remove and replace approximately 110 feet of RCB due to increased cover • San Diego Creek Channel (Reach 2) – Bridge widening along NB I-405 (downstream end)	• Floodplain encroachments on the San Diego Creek Channel to accommodate the widening of Bridge No. 55-0285 at Reach 1 and Bridge No. 55-0451 at Reach 2 • Construction within five floodplains • San Diego Creek Channel (Reach 1) – Bridge widening along NB I-405 (upstream end) • San Joaquin Channel (Harvard) – Extend culvert at the upstream end and possibly on the downstream end as well; Modify inlet and outlet headwalls • Culver Storm Channel – Extend culvert at the upstream end and modify inlet headwall • San Joaquin Channel (Jeffrey) – Culvert extensions and inlet/outlet modifications may be required • San Joaquin Channel (Sand Canyon) – Protect in place • Channel F05S03 – Remove and replace approximately 110 feet of RCB due to increased cover • San Diego Creek Channel (Reach 2) – Bridge widening along NB I-405 (downstream end)
Water Quality and Stormwater Runoff	• No Impacts	• Results in an increase in new impervious surface area approximately 0.5 acre less than Alternative 3	• Results in an 8.12-acre increase in new impervious surface area (an increase of approximately 2 percent)
Geology/Soils/Seismic/Topography	• No Impacts	• No Impacts	• No Impacts
Paleontology	• No Impacts	• Construction-related earth-moving activities would have a potential to affect paleontological resources	• Construction-related earth-moving activities would have a potential to affect paleontological resources

Table 1-9. Comparison of Alternatives

Evaluation Criteria	Alternative 1 (No Build)	Alternative 2 (Preferred Alternative)	Alternative 3
Hazardous Waste/Materials	• No Impacts	Potential concerns include: • Historic diesel soil contamination in the shoulder of I-405 SB at Von Karman Avenue and south of Von Karman Avenue • Historic gasoline soil contamination in the shoulder of I-405 NB Jamboree Road off-ramp • ADL in the near-surface soils in unpaved areas of I-405 • Yellow thermoplastic and yellow painted freeway striping and pavement markings, which may contain lead chromate • Widening would be required of Bridge No. 55-0285 and Bridge No. 55-0451. Based on their age, there is a potential for the structures to contain ACM and LBP. Drainage culverts targeted for improvements associated with the proposed project may also contain ACM and LBP • Creosote-treated wood power poles located within the permanent acquisition area and/or TCE of APN 466-083-14 • Stockpile of unknown origin consisting of soil and demolition debris at I-405 SB onramp to SR-133	Potential concerns include: • Historic diesel soil contamination in the shoulder of I-405 SB at Von Karman Avenue and south of Von Karman Avenue • Historic gasoline soil contamination in the shoulder of I-405 NB Jamboree Road off-ramp • ADL in the near-surface soils in unpaved areas of I-405 • Yellow thermoplastic and yellow painted freeway striping and pavement markings, which may contain lead chromate • Widening would be required of Bridge No. 55-0285 and Bridge No. 55-0451. Based on their age, there is a potential for the structures to contain ACM and LBP. Drainage culverts targeted for improvements associated with the proposed project may also contain ACM and LBP • Creosote-treated wood power poles located within the permanent acquisition area and/or TCE of APN 466-083-14 • Stockpile of unknown origin consisting of soil and demolition debris at I-405 SB onramp to SR-133
Air Quality	• No Impacts	• According to the USGS Survey Map for Asbestos in California, there is no occurrence of asbestos reported within a 25-mile vicinity of the project area • It is not anticipated that construction of the proposed project would involve disturbance of soils containing high levels of ADL, or painting or modification of structures with Pb-based coatings using sandblasting and other activities related to Pb paint removal or disturbance • Asphalt paving, may result in short-term odors in the immediate area of each paving site(s) • Short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and various other construction-related activities • Alternative 2 would generate daily regional emissions of lesser magnitude than Alternative 3 for mobile source air toxics	• According to the USGS Survey Map for Asbestos in California, there is no occurrence of asbestos reported within a 25-mile vicinity of the project area • It is not anticipated that construction of the proposed project would involve disturbance of soils containing high levels of ADL, or painting or modification of structures with Pb-based coatings using sandblasting and other activities related to Pb paint removal or disturbance • Asphalt paving, may result in short-term odors in the immediate area of each paving site(s) • Short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and various other construction-related activities • Alternative 3 would generate daily regional emissions of greater magnitude than Alternative 2 for mobile source air toxics
Noise and Vibration	• Noise levels would approach or exceed the Noise Abatement Criteria • Soundwalls would not be constructed • Future predicted traffic noise levels range from 52.5 to 79.7 dBA; when compared to existing conditions, the absolute increase of noise does not exceed 3 dBA and would be barely perceptible to the human ear	• Noise levels would approach or exceed the Noise Abatement Criteria • Two soundwalls are proposed. New soundwall S255 is located on the State ROW line at the SB Jeffrey Road/University Drive off-ramp, and Soundwall S322 - Option 1 is located on the State ROW along NB I-405 between Yale Avenue and Culver Drive and along the NB Culver Drive off-ramp. • Future predicted traffic noise levels range from 52.9 to 75.9 dBA; when compared to existing conditions, the absolute increase of noise does not exceed 3 dBA and would be barely perceptible to the human ear	• Noise levels would approach or exceed the Noise Abatement Criteria • Two soundwalls are proposed. Soundwall S255 located on the State ROW line at the SB Jeffrey Road/University Drive off-ramp, and Soundwall S322 - Option 1 is located on the State ROW along NB I-405 between Yale Avenue and Culver Drive and along the NB Culver Drive off-ramp. • Future predicted traffic noise levels range from 52.9 to 76.0 dBA; when compared to existing conditions, the absolute increase of noise does not exceed 3 dBA and would be barely perceptible to the human ear
Natural Communities	• No Impacts	• 0.17-acre impact to riparian resources	• 0.17-acre impact to riparian resources
Wetlands and Other Waters	• No Impacts	• 0.033-acre impact to USACE/RWQCB Wetland “Waters of the U.S.” (temporary and permanent) • 3.751-acre impact to USACE/RWQCB Non-wetland “Waters of the U.S.” (temporary and permanent) • 0.033-acre impact to CDFW Riparian (temporary and permanent) • 9-acre impact to CDFW Streambed (temporary and permanent)	• 0.033-acre impact to USACE/RWQCB Wetland “Waters of the U.S.” (temporary and permanent) • 3.751-acre impact to USACE/RWQCB Non-wetland “Waters of the U.S.” (temporary and permanent) • 0.033-acre impact to CDFW Riparian (temporary and permanent) • 9-acre impact to CDFW Streambed (temporary and permanent)
Plant Species	• No Impacts	• No Impacts	• No Impacts

Table 1-9. Comparison of Alternatives

Evaluation Criteria	Alternative 1 (No Build)	Alternative 2 (Preferred Alternative)		Alternative 3	
Animal Species	• No Impacts	• 0.37-acre impact to Western Spadefoot Habitat • 0.25-acre impact to Coastal Whiptail Habitat • 0.37-acre impact to Western Pond Turtle Habitat • 0.35-acre impact to Two-Striped Garter Snake Habitat • 138.52-acre impact to Cooper's Hawk Habitat • 59.16-acre impact to Ferruginous Hawk Habitat • 58.13-acre impact to California Horned Lark • 138.52-acre impact to White-Tailed Kite Habitat • 0.35-acre impact to Yellow-Breasted Chat Habitat • 0.35-acre impact to Yellow Warbler • 138.52-acre impact to Bat Habitat • 59.93-acre impact to Bobcat Habitat • 0.24-acre impact to Mountain Lion Habitat		• 0.37-acre impact to Western Spadefoot Habitat • 0.25-acre impact to Coastal Whiptail Habitat • 0.37-acre impact to Western Pond Turtle Habitat • 0.35-acre impact to Two-Striped Garter Snake Habitat • 138.52-acre impact to Cooper's Hawk Habitat • 59.16-acre impact to Ferruginous Hawk Habitat • 58.13-acre impact to California Horned Lark • 138.52-acre impact to White-Tailed Kite Habitat • 0.35-acre impact to Yellow-Breasted Chat Habitat • 0.35-acre impact to Yellow Warbler • 138.52-acre impact to Bat Habitat • 59.93-acre impact to Bobcat Habitat • 0.24-acre impact to Mountain Lion Habitat	
Threatened and Endangered Species	• No Impacts	• Up to 0.35-acre impact to suitable foraging habitat for the California least tern • 0.35-acre impact to suitable least Bell's vireo habitat		• Up to 0.35-acre impact to suitable foraging habitat for the California least tern • 0.35-acre impact to suitable least Bell's vireo habitat	
Invasive Species	• No Impacts	• Temporary Construction Impact – Potential to spread invasive species by the entering and exiting of construction equipment contaminated by invasive species		• Temporary Construction Impact – Potential to spread invasive species by the entering and exiting of construction equipment contaminated by invasive species	
Capital Cost Estimate		**Current**	**Escalated**	**Current**	**Escalated**
Capital Outlay Support	None	$32M	$41M	$38M	$45M
Capital Outlay Construction	None	$93M	$122M	$105M	$138M
Capital Outlay Right-of-Way	None	$6M	$13M	$8M	$16M

1.4.4 Transportation System Management and Transportation Demand Management

The Transportation System Management (TSM)/Transportation Demand Management (TDM) Alternative does not meet the project purpose as a stand-alone alternative. This alternative consists primarily of operational investments, policies, and actions aimed at improving traffic flow, promoting travel safety, and increasing transit usage and rideshare participation. Although this alternative would provide minimal enhancement of operations, it would not maximize throughput or provide trip reliability for the corridor.

TSM consists of strategies to maximize efficiency of the existing facility by providing options such as ridesharing, parking, and traffic-signal optimization. TSM options to improve traffic flow typically increase the number of vehicle trips a facility can carry without increasing the number of through lanes. Such strategies include replacing existing stop signs with traffic signals at intersections to improve existing peak-hour traffic flow and to reduce queuing of vehicles. TSM also encourages automobile, public and private transit, ridesharing programs, and bicycle and pedestrian improvements as elements of a unified urban transportation system. Multimodal alternatives integrate multiple forms of transportation modes, such as pedestrian, bicycle, automobile, rail, and transit.

TDM focuses on regional strategies for reducing the number of vehicle trips and VMT, as well as increasing vehicle occupancy. It facilitates higher vehicle occupancy or reduces traffic congestion by expanding the traveler's transportation choice in terms of travel experience. Typical activities within this alternative reduce the amount of single-occupancy vehicle trips by providing funds to regional agencies that are actively promoting ridesharing, maintaining rideshare databases, and providing limited rideshare services to employers and individuals.

Promoting mass transit and facilitating nonmotorized alternatives are two such examples, but TDM strategies may also include reducing the need for travel altogether through initiatives such as telecommuting.

Although TSM and TDM measures alone could not satisfy the purpose and need of the project, the following TSM measures may be incorporated into the build alternatives for this project:

- Improved ramp metering hardware and software
- Additional way-finding signs on freeways and improved safety features
- Traveler Information Management System improvements to enhance dissemination of real-time information on roadway conditions

- ITS elements, including fiber-optic and other communication systems for improved connectivity and remote management; changeable message signs (CMS); closed-circuit television (CCTV) coverage of the entire freeway mainline, ramps, and adjacent arterials; video detection systems; and vehicle detection systems for volume, speed, and vehicle classification

1.4.5 Identification of a Preferred Alternative

A Preferred Alternative was identified after considering all information in the Draft IS/EA and technical studies. It was also based on extensive input from the Project Development Team (PDT) members, public, stakeholders, and federal, state, regional, and local agencies during the project development process. Public outreach and coordination resulted in comments from the public and governmental agencies; all of which were carefully considered during the Preferred Alternative identification process. Consideration was given to all issues raised during the public circulation period.

On February 6, 2018, the PDT evaluated the alternatives under consideration and identified Alternative 2 as the Preferred Alternative for the I-405 Improvement Project from I-5 to SR-55. As part of the evaluation, 10 evaluation criteria were established to compare the alternatives, as shown in Table 1-10. A weight factor, which was agreed to by the PDT, was also given to each of the evaluation criteria based on the relative importance. The alternatives were then compared and ranked for their relative performance, and the scores were computed.

Table 1-10. Alternative Evaluation

Evaluation Criteria		W[1]	Performance Ranking			Score		
			Alternative					
			1	2	3	1	2	3
1	Addition of mainline capacity to reduce congestion and improve mobility Alternative 1: GP density 58.7, HOV v/c 0.59 Alternative 2: GP density 47.4, HOV v/c 0.58 Alternative 3: GP density 43.4, HOV v/c 0.57	2	1	2	3	2	4	6
2	Improvement to ramp capacity, operation, and geometric deficiencies Alternative 1: Ramp v/c 0.44 Alternative 2: Ramp v/c 0.42 Alternative 3: Ramp v/c 0.43	1	1	3	2	1	3	2

Table 1-10. Alternative Evaluation

Evaluation Criteria		W(1)	Performance Ranking			Score		
			Alternative					
			1	2	3	1	2	3
3	Improvements to freeway operation and speed Alternative 1: 41 mph Alternative 2: 46 mph Alternative 3: 49 mph	1	1	2	3	1	2	3
4	Minimization of utility impacts Alternative 1: 0 utilities impacted Alternative 2: 8 utilities impacted Alternative 3: 10 utilities impacted	1	3	2	1	3	2	1
5	Minimization of right-of-way acquisitions Alternative 1: 0 properties impacted Alternative 2: 2 partial acquisition Alternative 3: 2 partial acquisition	1	3	2	2	3	2	2
6	Consistency with regional plans (RTP/SCS and FTIP) Alternative 1: no Alternative 2: yes Alternative 3: no	2	1	3	2	2	6	4
7	Reduction of vehicle hour delays per tax dollar spent Alternative 1: 0 Alternative 2: 6,250 million hours Alternative 3: 6,250 million hours	1	1	2	2	1	2	2
8	Consistency with Caltrans Transportation Concept Report and District 12 Managed Lane Network Plan Alternative 1: no Alternative 2: yes Alternative 3: no	2	1	3	2	2	6	4
9	Consistency with Assembly Bill 32 Global Warming Solutions Act/Senate Bill 375 Sustainable Communities and Climate Protection Act Alternative 1: no Alternative 2: yes Alternative 3: no	2	1	3	2	2	6	4
10	Consistency with Senate Bill 743, Transportation Act Alternative 1: 911 million VMT Alternative 2: 943 million VMT Alternative 3: 960 million VMT	2	3	2	1	6	4	2
Weighted Total Score						**23**	**37**	**30**

W(1)= a weight factor between 1 and 3 was given to each of the criteria based on the relative importance.

Each alternative was scored based on the weighted criteria above. Alternative 2 had the highest score of 37, Alternative 3 had a score of 30, and Alternative 1 had a score of 23. Based on the scoring, the PDT identified Alternative 2 as the Preferred Alternative to move forward for implementation.

1.4.6 Alternatives Considered but Eliminated from Further Discussion Prior to the Draft Initial Study/Environmental Assessment

NEPA and CEQA include guidance on the screening process to assess the viability of the alternatives and/or design variations and identify reasonable alternatives. The initial screening process is intended to eliminate from further study alternatives and/or design variations that are not considered reasonable or feasible. The intention is to identify only the most viable alternatives for further detailed environmental evaluation. CEQA provides three factors that may be used to eliminate an alternative from detailed consideration in an initial study, including (i) failure to meet most of the basic project objectives, (ii) infeasibility (see CEQA Guidelines Section 15126.6(f)(1)), or (iii) inability to avoid significant environmental impacts.

Alternatives 2a and 3a were previously proposed during environmental technical report preparation; however, these alternatives were later eliminated from further consideration because they did not meet the project purpose and need. Alternatives 2a and 3a both involve the addition of a grade separation for the Irvine Center Drive SB off-ramp and the N133-S405 branch connector. This action was previously proposed to eliminate the mainline weaving between the closely spaced SR-133 and Irvine Center Drive interchanges; however, subsequent traffic analysis determined that the SB braided ramps would not provide any additional benefits in terms of traffic or congestion alleviation along the I-405 mainline, while adding approximately $40 million to the overall construction cost. Furthermore, the SB braided ramps would not permit the SR-133 traffic to exit Irvine Center Drive. The weaving analysis performed in the traffic study showed that the SB auxiliary lane between SR-133 and Irvine Center Drive has no operational issues. Furthermore, current and future LOS would remain acceptable. These alternatives do not address the project purpose to improve freeway operations; therefore, they were dropped from further consideration.

Alternatives 2a and 3a were analyzed in the technical reports prepared to support this environmental document. Because these alternatives are no longer being considered, they are not analyzed in the environmental document.

Additionally, AB 2542 requires any state or local automobile capacity increasing project or highway realignment project approved by the California Transportation Commission to have considered reversible lanes in the design of the project. The Caltrans Liaison for Managed

Lanes and Tolling Support applies AB 2542 only to projects programmed after January 1, 2017. Programming for this project was finalized prior to January 1, 2017; therefore, AB 2542 does not apply.

As discussed in Section 1.4.4, above, the TSM/TDM Alternative was removed from further consideration because it could not satisfy the purpose and need of the project.

1.5 Permits and Approvals Needed

Table 1-11 shows the permits, reviews, and approvals that would be required for project construction.

Table 1-11. Permits and Approvals Needed

Agency	Permits, Licenses, Agreements, and Certifications	Status
California Transportation Commission (CTC)	CTC vote to approve funds	Following approval of the final environmental document
California Department of Fish and Wildlife (CDFW)	Streambed Alteration Agreement	To be obtained prior to construction
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA) Section 404 Letter of Permission pursuant to OCTA/Caltrans File No. SPL-2012-00830-VCL	To be obtained prior to construction
Santa Ana Regional Water Quality Control Board (RWQCB)	CWA Section 401 Water Quality Certification Orange County MS4 Permit (Order No. R8-2009-0030, NPDES CAS618030, as amended by Order No. R8-2010-0062)	To be obtained prior to construction
FHWA	Air Quality Conformity Determination	Obtained June 7, 2018
State Water Resources Control Board (SWRCB)	CWA Section 402 – National Pollutant Discharge Elimination System (NPDES) Caltrans Statewide Storm Water Discharge Permit (Order No. 2012-0011-DWQ; NPDES No. CAS000003), as amended under Order No. 2014-0077-DWQ	To be obtained prior to construction
	Construction General Permit (Order No. 2009-0009-DWQ; NPDES No. CAS 000002), as amended by Order No. 2010-0014-DWQ and 2012-0006-DWQ	Design and Construction - Verification of permit compliance
	General Waste Discharge Requirements for Discharges to Surface Waters Which Pose an Insignificant (de Minimis) Threat to Water Quality within the San Diego Creek/Newport Bay under Order No. R8-2009-0045, NPDES No. CAG918002 and Order No. R8-2015-004, NPDES No. CAG998001 for sites outside the San Diego/Newport Bay Watershed	Design and Construction - Verification of permit compliance
Orange County Flood Control District (OCFCD)	Encroachment Permit	To be obtained prior to construction

Agency	Permits, Licenses, Agreements, and Certifications	Status
City of Irvine	Permit pursuant to City of Irvine Municipal Code Section 5-7-410 for Tree Removal	To be obtained prior to clearing of trees
Cities of Irvine and Costa Mesa and Orange County	Grading Permit	To be obtained prior to any grading.
City of Irvine, Orange County and applicable NEPA assignment agency	Final *De Minimis* Impact Concurrence – San Diego Creek Trail (South)	Obtained February 21, 2018, from the County Obtained April 13, 2018, from the City
City of Irvine, Orange County and applicable NEPA assignment agency	Final *De Minimis* Impact Concurrence – Freeway Trail	Obtained February 21, 2018, from the County Obtained April 13, 2018, from the City
City of Irvine, Orange County and applicable NEPA assignment agency	Final *De Minimis* Impact Concurrence – San Diego Creek Trail (North)	Obtained February 21, 2018, from the County Obtained April 13, 2018, from the City